

Faculty of Engineering and Technology Master Program of Computing

Arabic Search Results Disambiguation: A Supervised Approach to Unsupervised Learning

Master's Thesis in Computing

By: Haytham Salhi

Supervised by:

Dr. Adnan Yahya and Dr. Radi Jarrar

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Haytham Salhi

Abstract

Web search engines aim at retrieving relevant results as a response to a given query, or more precisely an information need. However, the query can be ambiguous, which means it might refer to different meanings or senses. Search results clustering (SRC) is a powerful approach that dynamically attempts to find groups of sense-relevant results. The preprocessing stage of SRC highly affects the effectiveness, and though there is a lot of research on SRC, the research has not yet clearly shown the best source from which features could be selected nor the best representation by which features could be represented. Moreover, a little amount of research, with the lack of Arabic datasets, has been paid to Arabic.

The major contributions of this thesis are fourfold: 1) It examines the influence of feature source (i.e., title, snippet, etc.) and feature representation on the effectiveness of SRC, figuring out the best combination that results in a high-quality clustering of Arabic Web search results. 2) It introduces a set of benchmarks for Arabic, called AMBIGArabic, and a new framework, called Spread, for data labeling, search results acquisition, and performing SRC experiments. 3) It shows how useful the blind relevance feedback concept is in SRC. 4) Lastly, it proposes a new SRC approach, called SAUL, along with an implementation of this approach based on Wikipedia as a source of the senses. The results show that feature sources and feature representations significantly affect the effectiveness of SRC, and combinations like (title with snippet, single words) and (title with snippet, single words with 2-gram and 3-gram words) are amongst the best. Also, by comparing the best combinations, the proposed approach outperforms the baseline approach.

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Chapter 1 Introduction

Search results disambiguation is the notion of how to disambiguate search results that are retrieved upon a user query having different word senses[3]. Thousands of documents could be returned by a web search engine in response to an ambiguous or imprecise query. A query for "Python", as an example, will return documents pertaining to the programming language, as well as to the snake, and the movie. Historically, this is very problematic, making it difficult for users to browse or identify relevant search results. This thesis intends to address this issue by providing a mechanism to cluster search results into different senses. This chapter introduces the thesis by starting with the motivation of this work, identifying the problem, stating the research gaps the thesis attempts to fill, briefly presenting the research methodology, and highlighting proposed solutions and contributions. Lastly, this chapter outlines the whole thesis report.

1.1 Motivation

Over the recent years, Web search engines have become an important part of our everyday lives as they make the lookup for an information rather easy and trivial. When a user poses a query, traditional Web search engines return a list of ranked results, often ordered by relevance to the query. Then, the user starts looking at the top results and goes down, until the needed information is found. This is indeed very useful when the query conveying the information is *clear* and *precise*. However, traditional Web search engines might be less effective when dealing with *ambiguous* or *broad* queries (i.e., queries that have more than one meaning or cover a variety of subtopics, respectively [4]) because the list of results would very likely contain results on different subtopics or meanings, thus making users walk through many irrelevant results.

Therefore, helping users find results satisfying their information needs, in the light of ambiguous queries, is of a great importance. To this end, researchers in academia and industry [5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17], have proposed many approaches that mitigate or solve this problem. These approaches relate to many disciplines such as Information Retrieval (IR), Machine Learning (ML), Natural Language Processing (NLP), and Human Computer Interaction (HCI).

1.2 Research Problem

One approach to search results disambiguation is search results clustering (SRC). It aims at grouping search results into clusters, each representing the results for one sense of the query. Typically, this is achieved by applying a clustering algorithm to search results returned by a Web search engine [5, 6, 7, 8, 9, 10]. Another one of the early approaches is based on the idea of classifying the entire Web pages, which results in Web categories and directories such as DMOZ $project^1$ (previously known as Open Directory Project). Even though it might be a good idea, for a Web search engine it is hard to maintain a large number of Web pages with respect to human labeling. Other approaches [14, 13, 15] tried to exploit some of natural language processing tasks such as word sense induction and word sense disambiguation. However, such approaches are usually based on knowledge repositories, which might cause additional overhead to the process of grouping. Other researchers [18, 19, 12] used a totally different approach that presents search results by achieving the maximum diversity between them, using what-so called diversification techniques. Others [20, 16, 17] exploit the query logs to find aspects of ambiguous queries by applying mining techniques. However, the last two approaches are usually studied and investigated by researchers who own such data (i.e., the query logs) like Google and Microsoft.

With all these approaches, this research looks into the SRC approach. This approach is challenged by three core requirements [21, 1]:

- 1. The clusters or groups should be of good quality (i.e., the degree to which search results in a cluster belong to same meaning) which is represented by the effective-ness of clustering.
- 2. The cluster labels must be understandable.
- 3. The clustering process must be efficient in terms of processing time needed to generate the clusters.

Each of these challenges is considered as a self-contained research problem. Therefore, the first requirement (i.e., effectiveness) represents the scope of this research. An important factor highly affecting the effectiveness is feature generation and space representations [21, 1, 22], which is often done in the preprocessing stage of search results clustering. Moreover, the preprocessing stage highly depends on the language being processed.

Knowing that most of proposed work has been done for the English, and though there has been increasing interest in studies [23, 24, 25, 26] concerning search results clustering for Arabic, the gaps that this research addresses can be summarized as follows:

1. In contrast to English, there is still no published benchmarks for Arabic, designated for performing experiments of search results clustering.

¹https://www.dmoz.org

- 2. There is no clear evidence that shows the source from which features are best selected nor the best space representation in vector space model, resulting in a high quality of search results clustering (in terms of effectiveness).
- 3. A big challenge still exists that relates to how to design a suitable model for clustering that competes with other traditional approaches in terms of clustering effectiveness [27].

1.3 Research Objectives and Methodology

The main objective of this research is to address some of the research gaps related to search results disambiguation for Arabic. Given some of the research gaps brought up in the previous paragraph, this research aims to:

- 1. Produce a corpus of Arabic Web search results that can be used to evaluate any search results clustering method.
- 2. Build a framework for conducting search results clustering experiments that is capable of fetching search results from different search engines like Google, Bing and Yahoo! and labeling search results with different approaches including a human assessment interface. This makes the running of experiments smooth and reproducible.
- 3. Study the influence of different feature sources and space representations on the effectiveness of search result clustering.
- 4. Propose a new clustering model for improving the effectiveness of search results clustering and as a solution to the problem of search results disambiguation.

To achieve that, this study followed the scientific method of research by conducting an experimental research to observe the influence of feature sources and space representations and to look into baseline and proposed approaches. The method fundamentally involves:

- Collecting data: one of the challenges in this study is to collect real Web search results in Arabic as there are no built benchmarks for that purpose according to best of our knowledge. English, in contrast, has already-built datasets for that purpose. The details of how data is collected, how the benchmarks are built, and how they are labeled are detailed in Chapter 4.
- Experimental design: one of the important things in experimental research is to specify the research hypothesis, the independent variables of interest, the dependent variable, and the neutralized ones. This is detailed in Chapter 5.
- Running experiments based on the design by building a framework to facilitate conducting and running the experiments.

• Evaluating the results against labeled search results to find the best of feature sources and space representations and to compare the traditional approach (i.e., the baseline) with the proposed approach. All evaluation metrics and results are detailed in Chapter 7.

1.4 Proposed Solution: AMBIGArabic, Spread, and SAUL

The contributions of this thesis are represented in the proposed solutions that mitigate some of the research gaps mentioned above in Section 1.2. In particular, this research has two major contributions:

- 1. It proposes a thorough experimental design that investigates the influence of feature sources and space representations on effectiveness of Arabic search results disambiguation and finding out the best combination for the clustering approach.
- 2. A new model (called SAUL) is proposed as a solution to search results disambiguation that augments a supervised approach into unsupervised learning and leverages the concept of blind relevance feedback (BRF) as well as clear queries. Additionally, a fully working demonstration of the SAUL approach is implemented by fetching meanings/senses from Wikipedia Disambiguation Pages (WDP), then fetching search results for each sense, and then building a supervised model based on those results and using the blind relevance feedback.

Other contributions include:

- 1. Building a crawler component that fetches search results for any query from different search engines like Google, Bing, and Yahoo!.
- 2. Developing a framework (called Spread) for performing search results clustering experiments that generates clustering results along with evaluations and graphs, and supports many parameters related to many aspects like data preprocessing, vector space representation, and algorithm-specific parameters.
- 3. Building a labeled corpus for Arabic search results (called AMBIGArabic) from Google and Bing, which can be used to evaluate any search results grouping method.
- 4. Proposing new approaches that assist in labeling the search results as well as building a human relevance assessment interface for labeling the search results by humans as a part of the framework.
- 5. Improving the evaluation strategy that is used in Weka for unsupervised learning as well as fixing a lot of Weka bugs².

²During the course of thesis work, about four critical bugs were reported and solved closely with Weka authors. These bugs are related to issues in ClassificationViaClustering components. Consequently, five minor releases were pushed to maven repository https://mvnrepository.com/artifact/nz.ac. waikato.cms.weka/classificationViaClustering. Their release notes can be found at http://weka. sourceforge.net/packageMetaData/classificationViaClustering/index.html

1.5 Outline

The rest of this report is structured as follows. Chapter 2 presents the main concepts and foundations. Chapter 3 discusses the approaches of search results disambiguation that have been developed in literature as well as related studies on Arabic. The remaining chapters represents the contributions of this thesis. Chapter 4 presents the data collection, showing the proposed AMBIGArabic benchmarks. The experimental design and methodology are discussed in Chapter 5. The Spread framework is explained in Chapter 6. Chapter 7 shows evaluation and statistics of experiments as well as main findings. Finally, chapter 8 concludes the report and plans for future work.

Chapter 2 Background

Dealing with search results disambiguation and search results clustering requires a basic knowledge of topics like information retrieval, machine learning, and natural language processing. This chapter presents the core concepts and definitions in those topics that are required to understand the content of this study.

This begins with a brief introduction of information retrieval and machine learning. It then explains the notion of queries and information needs, then an overview of clustering and how it is typically evaluated. Finally, this chapter goes through a quick overview of feature selection and feature extraction, and how they are perceived in the context of this work.

2.1 Information Retrieval and Machine Learning

For most people, looking up information on the Web has become a daily activity. Because search is one of the popular uses of the Internet, many people in academia and industry are trying to come up with easier and faster ways to improve the process of finding the right information [1]. The field that these people are working in is called *Information Retrieval*.

A good definition proposed by Gerard Salton [28], a pioneer in information retrieval, states: "Information retrieval is a field concerned with the structure, analysis, organization, storage, searching, and retrieval of information". Two important concepts of the information retrieval in this research, *query* and *information need*, are discussed next in Section 2.2.

In fact, the field of information retrieval considerably overlaps the field of machine learning. The ranking of documents was improved by introducing a technique called relevance feedback, which is based on user feedback about the relevance of documents. This was achieved by using a simple machine learning algorithm that produced a classifier to separate relevant from non-relevant documents [1]. Machine learning approaches are used by information retrieval researchers for many purposes like learning ranking algorithms, development of sophisticated statistical models of text, or even document categorization/clustering [1]. The idea of making computer systems learn, without being explicitly programmed, using statistical technologies is the heart of machine learning field [29]. The algorithms in machine learning are often characterized as supervised or unsupervised [1, 29].

In supervised learning, a model is built using a set of fully labeled data. This set is often called the *training dataset*. After the model is built, it can then be applied to a set of unlabeled data, which is often called the *test dataset*, to automatically assign labels. The problem of classification is often considered as a supervised learning task [1, 29]. As an example, given a set of emails labeled as "spam" or "ham", a classification model can be built based on these labeled data. Then this model can be used to automatically classify unseen emails as "spam" or "ham".

In unsupervised learning, on the other hand, the algorithms learn completely based on unlabeled data. Clustering is the most common task in unsupervised learning [1, 29]. As it will be shown further in Section 2.3, a clustering algorithm takes a set of unlabeled data as input and group the items based on some notion of similarity [1, 29].

2.2 Queries and Information Needs

Even though the search engine index (i.e., the place where all documents a search engine has collected is stored in) and ranking algorithms are the main components in any search engine, from a user's point of view, the search engine is basically an interface for entering *queries* and seeing *results*. One of the important things is to distinguish between *query* and *information need* when it comes to information retrieval. They are related to each other but represent two different concepts. Information need represents the required information a user is looking for. In other words, it represents the information that is in user's mind. Query is the actual words that are written by users to express their information need [1].

Given the fact that in some cases it could be difficult for people to exactly define what their information need is due to a gap in their knowledge, a query can represent different information needs and consequently might require different techniques and ranking algorithms to obtain the best ranking. Moreover, the query can happen to be a poor representation of the information need because the user might find it difficult to express their information needs, or more often the user is encouraged to enter queries with small number of words, leaving the query *ambiguous* or *imprecise* [1].

2.3 Clustering

Two important machine learning tasks are widely used in information retrieval tasks, *classification* and *clustering*. These two tasks have many features in common and can be useful for ranking documents [1]. On one hand, classification is concerned with automatically labeling data like emails, web pages, or images based on historical data (i.e., labeled data) on which a classification model is built. Clustering, on the other hand, is concerned with grouping similar items together, resulting in one or more clusters which do not necessarily correspond to a useful label or meaning [1].

Unlike classification, clustering algorithms are based on unsupervised learning, meaning that they do not require any training dataset. Clustering algorithms take a set of unlabeled items as input and group (cluster) them based on some notion of similarity [1, 29]. While classification has very clear objectives, clustering is often an ill-defined problem. The decision whether the resulting clustering is good, is often defined very subjectively [1].

2.3.1 Clustering Algorithms

Many algorithms exist for clustering. They differ primarily in their definition of what constitutes clusters and how to efficiently find them. One of the reasons why there are many clustering algorithms is that the notion of cluster itself cannot be precisely defined [30]. Because researchers can employ different clustering models and for each of these models different algorithms can be given, clustering algorithms can be classified into different types such as hierarchical clustering, centroid-based clustering, distribution-based clustering, and density-based clustering [30]. A brief description of the hierarchical clustering is given below. Additionally, since the K-means algorithm is the major theme of this study, the next discussion of centroid-based clustering is limited to K-means algorithm.

2.3.1.1 Hierarchical Clustering

Algorithms falling into this type build clusters in a hierarchical fashion. These algorithms are often grouped into two types, depending on how the algorithm works. The first type is called *divisive algorithms*, which begins with a single cluster containing all instances. In each iteration, it selects an exiting cluster and divides it into more clusters.

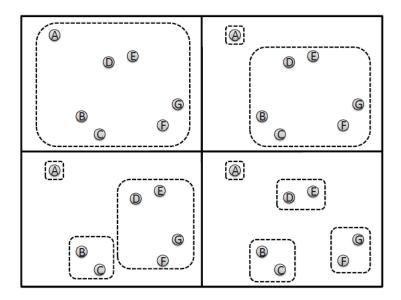


Figure 2.1: An illustration of divisive clustering with K = 4 [1].

This process is repeated until having a total of K clusters, where K is a given number. Figure 2.1 [1] gives an example of divisive clustering with K = 4. The clustering starts and proceeds from left to right and top to bottom, resulting in 4 clusters.

A similar process happens in the other type, agglomerative algorithms, which follows a bottom-up approach. An agglomerative algorithm starts with each input as a separate cluster. Then it proceeds by joining more than one existing clusters to form a new cluster [1]. Figure 2.2 [1] gives an example of agglomerative clustering with K = 4. The clustering starts and proceeds from left to right and top to bottom, resulting in 4 clusters.

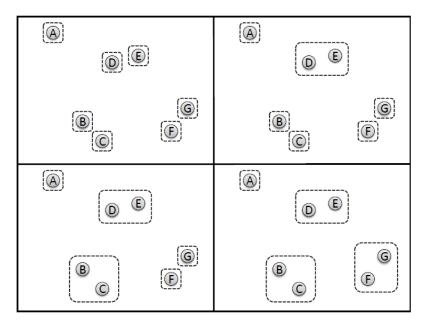


Figure 2.2: An illustration of agglomerative clustering with K = 4 [1].

2.3.1.2 Centroid-based Clustering: K-means

This type of algorithms is fundamentally different than the hierarchical clustering previously described. In contrast to hierarchical clustering, the number of clusters in Kmeans never changes. That is, the algorithm start with K clusters and ends with same number of clusters [1]. A formal definition is usually given as an optimization problem: "find the K cluster centers and assign the objects to the nearest cluster center such that the squared distances from the cluster are minimized" [30]. Therefore, the main goal of the K-means algorithm is to find the cluster assignment vectors A[1], A[2], ..., A[N], that minimize the following cost function [1]:

$$COST(A[1], A[2], ..., A[N]) = \sum_{k=1}^{K} \sum_{i:A[i]=k} dist(X_i, C_k)$$
(2.1)

where $dist(X_i, C_k)$ is the distance between instance X_i and class C_k . This distance

measure can be any reasonable distance measure. One of the most common measures is the Euclidean distance, as given below [1]:

$$dist(X_i, C_k) = ||X_i - \mu_{C_k}||^2 = (X_i - \mu_{C_k}).(X_i - \mu_{C_k})$$
(2.2)

where μ_{C_k} is the centroid of cluster C_k .

The cosine similarity between X_i and μ_{C_k} can be used instead as the distance measure, especially for some text applications, since it has been shown to be more effective than Euclidean distance [1].

The main steps of K-means algorithm are described by Algorithm 1 [2]. Figure 2.3 [2], which shows how the final clusters are found in four iterations, illustrates the operation of K-means algorithm. Each subfigure shows:

- 1. The centroids (indicated by the "+" symbol) at the start of the iteration.
- 2. The assignments of the points to these centroids; all points that are in the same cluster have the same marker shape.

Algorithm 1 K-means algorithm [2]

- 1: Select K points as initial centroids.
- 2: repeat
- 3: Form K clusters by assigning each point to its closet centroid.
- 4: Recalculate the centroid of each cluster.
- 5: until Centroids do not change.

In the first iteration, the algorithm assigns points, which are all in the larger group, to the initial centroids. After the algorithm assigns points to a centroid, the centroid is then updated. In the second iteration, the algorithm assigns points to the updated centroids, and the centroids are updated again. In iterations 2, 3, and 4, shown in Figure 2.3 (b), (c), and (d), respectively, two centroids move to the two small groups at the bottom [2].

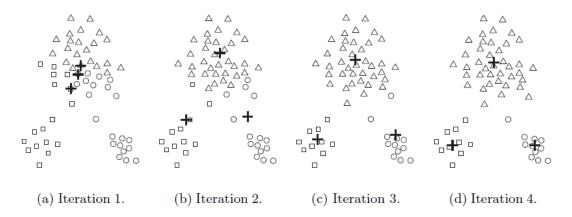


Figure 2.3: Finding three clusters using the K-means algorithm [2].

Finally, because no more changes occur, the K-means algorithm terminates, and the centroids have identified the groupings of points [2]. K-means always converges to a solution for some combinations of distance functions and types of centroids. In other words, K-means reaches a state in which the centroids no longer change. Since most of convergence occurs in the early steps of the algorithm, however, the condition in the until statement of Algorithm 1 above is typically replaced by a weaker condition [2], for example, repeat until 1.5% of the points change clusters.

One big advantage for K-means is that, when compared to hierarchical clustering, K-means is more efficient. In particular, $K \times N$ distance computations are needed in each iteration, and the number of iterations is often small. Therefore, implementations of K-means algorithm are $\mathcal{O}(KN)$, which is much better than $\mathcal{O}(N^2)$ complexity of hierarchical methods. In practice, K-means algorithm tends to converge very quickly to a solution. Although it is not guaranteed to find the optimal solution, the solution is often optimal or close to optimal [1]. Moreover, although the final clusters produced by the algorithm depend on the initial seed (i.e., the starting points chosen as initial clusters) and on the ordering of the input data, K-means generally produces clusters of similar quality to hierarchical methods [1]. Given these facts, K-means is a good choice for a wide range of information retrieval-related tasks, especially for large datasets [1].

2.3.2 Clustering Evaluation

Evaluation in clustering is not as comprehensive as the evaluation of classification and thus can be challenging. Since clustering is an unsupervised learning, there is often little or no labeled data to use for the evaluation [2, 1].

When there is no labeled training data, *internal evaluation* or *unsupervised evaluation* is used to evaluate clustering model. If there is labeled data, however, *external evaluation* or *supervised evaluation* is used [2]. In internal evaluation, the clustering output is evaluated based on the data that was originally clustered. Internal evaluation methods usually assign the best score to the algorithm producing clusters with high similarity within a cluster and low similarity between clusters. Examples of such methods include: davies-bouldin index, dunn index, and silhouette coefficient. Though these methods are well-suited to give some insights into situations where one algorithm performs better than another, two main drawbacks exist [2, 30]:

- Getting a high score does not necessarily mean that this is an effective information retrieval application.
- The evaluation can be biased towards algorithms that use same objective function. K-means, as an example, naturally optimizes distances, and therefore a distancebased internal criterion will likely overrate the resulting clustering.

If labeled data is available, then it is possible to use slightly modified version information retrieval/classification metrics, such as accuracy (A) (i.e., the proportion of correctly classified predictions), precision (P) (i.e., the proportion of positive instances that are truly positive), Recall (R) (i.e., the proportion of positive instances that are correctly classified), and F-measure (F) (i.e., combines both precision and recall in a single value) [2, 1]. This is referred to as external evaluation. In other words, the clustering output is evaluated based on data that was not used for clustering and often created by humans (i.e., experts). Such data is also called external benchmarks. Examples of such methods include: Rand index, F-measure, Jaccard index, mutual information, and confusion matrix [2, 30].

A popular external evaluation method, which is used in this study, is called classesto-clusters method [31]. This method evaluates the clustering model based on labeled training datasets by mapping the clusters back onto classes, and then using the standard classification measures such as: accuracy, precision, recall, F-measure, confusion matrix, and many others. The definitions of these metrics are shown in Table 2.1; the assumption is there exist two classes A and B, for illustration. The equations in the table are based on the following definitions[29, 2]:

- 1. TP (True Positive): Number of of positive instances labeled as such.
- 2. FP (False Positive): Number of negative instances labeled as positive.
- 3. TN (True Negative): Number of negative instances labeled as such.
- 4. FN (False Negative): Number of negative instances, labeled as positive.

Evaluation Metric	Equation
Precision (P)	$\frac{TP}{TP+FP}$
Recall (R)	$\frac{TP}{TP+FN}$
Accuracy (A)	$\frac{TP+TN}{TP+TN+FP+FN}$
F-measure (F)	$\frac{2*P*R}{P+R}$
Weighted Precision	$\frac{ClassSize(A)*P(A)+ClassSize(B)*P(B)}{TotalSize}$
Weighted Recall	$\frac{ClassSize(A) * R(A) + ClassSize(B) * R(B)}{TotalSize}$
Weighted Macro F-measure	$\frac{ClassSize(A) * F(A) + ClassSize(B) * F(B)}{TotalSize}$
Unweighted Macro F-measure	$rac{F(A)+F(B)}{2}$
Micro F-measure	$\frac{2*P*R}{P+R}$ but for aggregate TP, FP, FN

Table 2.1: The definition list of external evaluation metrics used in this thesis.

2.4 Features in Machine Learning

In machine learning, a feature is an individual measurable attribute of a phenomenon being observed. One of the important aspects for effective machine learning algorithms is to choose informative and independent features. Features can be classified into relevant, irrelevant, and redundant [32]. There are two similar but different concepts related to features: *feature selection* and *feature extraction*.

The main goal of feature selection is to select only those input dimensions (i.e., features) that contain relevant information for solving a particular problem, usually resulting in dimensionality reduction [33, 32]. As an example, removing words such as "the" might be very useful in improving the clustering results. Feature extraction is a more general idea with the goal of transforming the input space onto low dimensional subspace that preserves most of relevant information [34]. Note that feature extraction and feature selection methods can be used in combination or isolated [32]. Several methods have been proposed to reduce data complexity to a simpler form of information [27]. These include: independent component analysis (ICA) [35] and principal component analysis (PCA) [36].

Since this work is concerned with text clustering, the focus of next discussion is on text feature extraction. Several machine learning algorithms like clustering algorithms work with features with a specific format (e.g., numerical). Thus, this often requires transforming arbitrary data, such as text, into numerical features to be usable for the machine learning algorithm [37]. A popular way to extract numerical features from text is to represent this text in a vector-space representation [38]. This process is called sometimes vectorization [37], where a collection of text documents is converted into numerical feature vectors. The main idea behind such process is that frequencies of words (or sometimes referred to as terms) are used for analysis. These frequencies are typically normalized with statistical values such as the length of the document. So, a text collection with n documents and "d" terms can be seen as $n \times d$ matrix [38]. This representation strategy is also called *bag-of-words* or *bag-of-n-grams* because the precise ordering of the words is lost in this representation [37, 38].

Chapter 3 Literature Review

The problem of search results disambiguation has been widely studied by the research communities, and many different solutions have been proposed. This chapter introduces the most important work for each approach of search results grouping, starting with search results clustering, which will be the focus of this study. Then it discusses the related work dealing with Web categorization and directories, results diversification, word sense induction and disambiguation, and finally aspect identification. In addition, a brief related work for text feature selection is presented. It then concludes with related work of search results clustering and how text feature extraction is performed for the Arabic language in the last section.

3.1 Search Results Disambiguation

3.1.1 Search Results Clustering

One of the popular solutions to query ambiguity is search result clustering (SRC). The motivation behind using clustering is that search results with same meaning of the posed query are expected to be similar, whereas search results with different meanings are expected to belong to different clusters. The basis for this motivation is the well-known *cluster hypothesis*, as stated by van Rijsbergen (1979): "Closely related documents tend to be relevant to the same requests" [21].

In general, SRC approaches can be divided into two groups, namely data-centric or description-centric [21]. The reasons behind this division are twofold. First, the resulting clusters should be accurate. Therefore, there should be a focus on clustering algorithms that produce high-quality clusters. Second, understandable, comprehensive, and compact cluster labels are considerably important; therefore, in search results clustering, description comes first (A very important conclusion credited to Vivisimo¹) [21]. These two approaches are reviewed next.

¹A private technology company specializing in the development of computer search engines

3.1.1.1 Data-centric approaches

The idea of data-centric is to focus on the problem of clustering search results rather than presenting results to users, by using a conventional clustering algorithm (partitional, hierarchical, or other) [21]. These algorithms dealing with search results are often slightly modified to produce more effective results for end users in this context [21]. A more popular approach called Scatter/Gather, developed by Cutting et al. [5], performs an initial clustering of a collection of documents into k clusters and, after user selects groups of interest, reclusters the selected groups dynamically. A classic method for this approach is called Buckshot algorithm [5]. Improved methods of this approach, in terms of cluster quality and retrieval performance, have been proposed later such as LAIR2 algorithm [6].

There are a lot of other data-centric approaches out there. Some use agglomerative hierarchical clustering, such as LASSI [22], where a traditional agglomerative hierarchical clustering algorithm is used, with an improved feature selection phase. Other approaches use rough sets model [7] or exploit link information [39].

Despite the power and strengths of data-centric text clustering algorithms in grouping search results, the only drawback is the problem of cluster labeling [21]. In particular, it is difficult to recover the description of a cluster from its feature vectors, where text is likely represented by a *vector space* representation. A keyword-based representation of descriptions is insufficient from the user perspectives. This was the main motivation of making algorithms aware of labeling results, yielding results interpretable to users [21].

3.1.1.2 Description-centric approaches

Other researchers tend to specifically design search results clustering methods that take into account both cluster quality and cluster descriptions. The quality of the latter often comes first, meaning that if a cluster cannot be described, it is probably of no value to users and should be removed [21].

Among these approaches are ones based on suffix trees, which are root directed trees that contain all the suffixes of a string. One of the earliest algorithms, called suffix tree clustering (STC) algorithm, that uses suffix trees, is that developed by Zamir and Etzioni [8] and implemented in a system called Grouper [9]. An edge of a suffix tree represents the label of a non-empty sub-string s and the label of each vertex v is formed by concatenating the edge labels on the path from the root r to v. If the set of strings (i.e., the bag of words) for search result snippets to be clustered are represented using suffix tree, we can consider each vertex as a set of documents that share its phrase (i.e., the label of the vertex). Therefore, one can see that the vertices represent the initial cluster set C_0 . The algorithm, with the aim of returning the top k clusters, produces the final clustering by merging similar clusters in C_0 according to a scoring function, defined based on the number of documents in the initial cluster and the length of common phrase [8].

The suffix trees approach received later some improvements. Branson and Green-

berg [40] improve the performance and overcome the low scalability of the original approach by using document-to-document similarity scores. Others like Crabtree et al. [41] found out an issue in the original scoring function and proposed the extended suffix tree clustering algorithm (ESTC) with a novel scoring function as well as a new method for selecting the top k clusters. Other work based on suffix trees, in order to choose meaningful labels for the clusters, attempts to extract relevant keyphrases from generalized suffix trees [42].

Lingo [10] is one of the descriptive-centric algorithms, especially designed for search results clustering. It was developed as a part of Carrot² framework. In a nutshell, Lingo has four main phases: snippets preprocessing, frequent phrases extraction, label induction, and content allocation. In the first three phases, it attempts to process search results to identify certain dominating topics, based on singular value decomposition. It is worth noting that if a certain vector has no frequent phrase, it would be simply discarded, following the idea introduced at the beginning of this section. The final phase involves that for each frequent phrase, the algorithm allocates search results which contain that frequent phrase. Lingo is monothetic clustering algorithm, i.e., label containment determines document-cluster relationship, where topics are generated by singular value decomposition, and the cluster descriptions are comprehensible because they are extracted directly from search results. However, singular value decomposition is rather computationally expensive [21].

There are many related approaches for search results clustering in the literature. These approaches are based on formal concept analysis [43], spectral clustering [44], spectral geometry [45], link analysis [46], or graph connectivity measure [47]. It is worth noting that most of the work in this area is done without explicit use of lexical semantics.

3.1.2 Web Categorization

One of the earliest approaches to grouping the results appeared in Web 1.0, where the Web is almost based on static web pages, is attempting to manually organize and categorize Web sites [13]. The resulting repositories are often referred to as *Web directories*, whereby the Web sites are listed by category or even by subcategories if possible. A property of these categories is that they are organized as taxonomies. Moreover, anyone can search for some information therein even though they are not real search engines [13]. A popular Web directory was called Open Directory Project (ODP), and it is now called DMOZ².

The idea of organizing results into a predefined set of categories is sometimes called *faceted classification*, or simply, *facets* [48]. This idea seems to be useful, especially for specific-domain Web sites (like e-commerce sites). However, building general Web directories suffers from: (1) the manual updates to cover new pages and new meanings. (2) covering a small portion of the Web. (3) classifying Web pages using coarse categories, which makes it difficult to distinguish between instances of the same type.

²https://www.dmoz.org

There are many methods and techniques developed for classifying Web documents automatically [49, 50, 11]; however, these are usually based on supervised-learning and suffer from reliance on a set of predefined classes. Moreover, Bruza et al. [51] reported that directory-based systems are among the most ineffective solution to information retrieval systems.

3.1.3 **Results Diversification**

Another approach that deals with query ambiguity and tries to disambiguate search results is called *diversification*. The idea is to rerank top search results based on criteria that maximizes their diversity so that top search results are as different as possible in terms of query senses/meanings. Nowadays, popular search engines, such as Google and Bing, apply such techniques to their top search results.

One of the early diversification algorithms was proposed by Carbonell and Goldstein [52]. It is mainly based on similarity functions to measure the diversity among documents themselves and between document and query. Some researchers tend to use techniques to specify which document is most different from top ranked ones. For example, Chen and Karger [53] proposed a technique that uses conditional probabilities, whereas Zhang et al. [54] ranks using affinity graph, which is based on topic variance and coverage.

While most search results ranking algorithms using heuristics such as global link analysis, user behavior, and content relevance, suffer from information redundancy in returned results, an interesting algorithm called Essential Pages [18] done by Microsoft, addresses this problem by returning a set of essential pages that maximizes the information covered over the total knowledge that exists on the Web about a given query. Another interesting work provides a systematic approach to diversifying results, yet aims to minimize the risk of dissatisfaction of the average user [19]. The authors developed a greedy algorithm that keeps relevance and diversity of the search results balanced.

Other work based on vector space representations have been proposed. Santamaria et al. [55] improved diversity in search results by representing Web page results as vectors and comparing them against Wikipedia pages using cosine similarity, thus adopting Wikipedia as sense inventory.

Other researchers tend to exploit the structure of the Web to diversify search results. Ma et al. [12] proposed approach that leverages Markov random walk and hitting time analysis on the query-URL bipartite graph. Chandar and Cartertte [56] diversify search results by proposing a graph-based method that exploits the links in the Web pages to find a result set of documents that cover various subtopics for a given query.

3.1.4 Word Sense Induction and Disambiguation

Other researchers have proposed to exploit two related but different ideas in attempt to address the query ambiguity issue: *word sense induction* (WSI) and *word sense disambiguation* (WSD). In particular, in WSI, the key idea is to dynamically discover an inventory of senses of the input query and then use these senses to cluster Web search results returned by a search engine. One of the first attempts was done by Schutze and Perdersen [57], where they showed that vector-based WSI can improve bag-of-words ad hoc information retrieval. Some studies done by Udani et al. [58] and others [14] proved that WSI can benefit Web search result disambiguation. Nguyen et al. [59] provided an interesting work that tries to identify query senses. It makes use of topic analysis models, such as probabilistic latent semantic analysis (PLSA) and latent Dirichlet allocation (LDA) to discover a set of hidden topics, thus improving the clustering quality. These topics are usually estimated from large (universal) data sets, meaning that they are query independent. Marco and Navigli [13], on the other hand, introduced a novel WSI-based approach that clusters Web search snippets after inducing various senses of the ambiguous query dynamically. They leveraged a finding of an exploratory study [60], stating that the majority of relevant uses of ten query words can be identified using graph-based WSI. As a result, Marco and Navigli [13] studied the impact of several graph-based WSI algorithm and integrated them in their clustering framework.

Some other studies used word sense disambiguation in their approaches. In contrast to WSI, the core idea is to use existing word senses (which are usually edited by humans) to cluster Web search results. Even though very little work on this idea exists, one recent work done by Huang et al. [15] is based on Wikipedia disambiguation pages. They improved clustering result by filtering semantically unrelated concepts and assigning search results to relevant topics based on the similarities between concepts in results and topics.

3.1.5 Query Logs Mining

Looking at query logs, one can see that it is a rich source that contains a large number of queries posed by users as well as click-through information. Wang and Zhai [20] proposed that query aspects can be identified by mining those queries that are similar or close to the current input queries. This line of research, so-called aspect identification, has been developed in this field over recent years, attempting to solve query ambiguity.

As a different approach, Wang et al. [16] presented a work that extracts broad latent aspects of a given query from query reformulations found in historical search session logs. Each broad latent aspect represents a set of keywords that convey one sense or one information need. Another interesting work [17] presented named entity topic modeling approach, which aims to discover generic topics for a category of named entities using query logs and click data.

Marco and Navigli [13] pointed out that even though this line of research has commonalities with word sense induction, there are also some differences. Most important, aspect identification discriminates between very fine-grained facets of a given query. WSI, in contrast, induces different meanings or senses of a given query. In addition, the data of query logs and click-through for search engines are often not available to public, thus making it hard to replicate and evaluate experiments, in comparison with other systems.

3.2 Feature Selection in Text Clustering

It is well known that feature selection is a very essential topic in text clustering [27]. This is because it significantly affects performance of clustering in terms of both *effectiveness* (i.e., the degree at which the algorithm produce correct clusters) and *efficiency* (i.e., the speed at which the algorithm produce the clusters) [27].

In the context of text categorization, it is common and easy to apply feature selection process under the assumption that supervision exists for that process [61]. On the other hand, a number of simple unsupervised methods can also be used in text categorization for feature selection process. This section reviews some examples of such methods.

3.2.1 Document Frequency

One of the simplest method that can be used in feature selection process is the use of document frequency (DF) to filter out irrelevant features. Simply put, the idea is based on the assumption that very frequent words are often not discriminative. Therefore, words that are too frequent in the corpus can be removed because they are often common words. Examples of words that are not discriminative include "a", "an" and "the". These words are also often known as *stop words*.

There are many methods available in the literature for stop-word removal [33]. Lists of about 350 to 400 stop words for different languages are available to be used in the retrieval process [33]. In some cases, it happens that words may be mistyped in document; therefore, words that occur extremely infrequently can be removed as well. Such words can more likely occur in Web pages like blogs or social networks [33]. The reason why these words can be removed is that they do not add anything to similarity calculations which are used in most clustering algorithms [33].

There is a weighting method, called Term Frequency - Inverse Document Frequency (TF-IDF), that can also be used to filter out the very common words in a soft way [62]. The TF-IDF is the product of two measures, term frequency (TF) and inverse document frequency (IDF). The TF, in the simplest form, represents the raw count of a term in a document. On the other hand, the IDF represents whether the term is common across all documents in the corpus [33]. There are many various ways to determine the exact values of both measures. Log normalization is one of the popular weighting schemes of TF, as shown in Formula 3.1 [33]. Also, one of the popular forms for IDF is shown in Formula 3.2 [33].

$$tf(t,d) = \log(1+f_{t,d})$$
 (3.1)

$$idf(t,D) = \log \frac{N}{n_t} \tag{3.2}$$

where t is the term that occurs in document d, $f_{t,d}$ is the raw count of the term t in the document d, N is the total number of documents in the corpus D, and n_t is the number of documents where the term t occurs.

3.2.2 Term Strength

Term strength method was originally proposed as a method that can be used in stop word reduction process in information retrieval by Wilbur and Sirotkin [63]. However, term strength was later applied in text categorization by Yang [64]. The idea is simply the more the term is strong the more the term is relatively informative and shared by related documents. One drawback of term strength: it may have high computation complexity due to the case of high number of documents, leading to difficulty with parameter tuning [27]. This method extends techniques used in supervised learning to the unsupervised learning [33].

The term strength is basically used to measure how good a word is for identifying two related documents. If there exist two related documents x and y, the term strength s(t) of the term t can be defined using the following probability [33]:

$$s(t) = P(t \in y | t \in x) \tag{3.3}$$

One main issue here is that how one can define the documents x and y as related. One solution to define when a pair of documents are related is to use manual user feedback, which is rather equivalent to utilizing supervision in the feature selection process [33]. However, this is not practical when manually creating related pairs in large collections [33]. As result, there should be an automated and unsupervised way to define the notion of when two documents are related. To define the relatedness of two documents automatically, automated similarity functions can be used such as cosine function [33]. Therefore, two documents are defined to be related if their cosine similarity is above a predefined threshold. In this case, the term strength s(t) can be defined by sampling a number of pairs randomly as in Formula 3.4 [33].

$$s(t) = \frac{\text{Number of pairs in which t occurs in both documents}}{\text{Number of pairs in which t occurs in the first document}}$$
(3.4)

where the first document can simply be picked randomly.

Now to prune features using the term strength method, the term strength s(t) can be compared to expected term strength that is randomly distributed in the training documents [33]. The term t is removed from the collection if s(t) is more than two standard deviations greater than that of the random word [33].

3.2.3 Term Contribution

The idea behind term contribution is based on the fact that results of document clustering are highly dependent on document similarity. The contribution of a term can be seen as its contribution to document similarity. As an example, the contribution of a term to the similarity of two documents is the dot product of normalized frequencies in these two documents [62]. A major drawback of this method is that it tends to favor highly frequent words without looking at the discriminative power in the clustering process. Moreover, this method consumes $\mathcal{O}(n^2)$ time for each term. Therefore, it may require sampling methods to speed up the contribution [62].

In most of these methods, there is a concern that the term selection might be biased to the similarity function (e.g., cosine) used in the process. This means that if a different similarity function is used, the method may end up having different results for term selection [62]. Therefore, the decision of selecting an appropriate similarity function is very important for these methods [62].

3.3 Search Result Clustering and the Arabic Language

Most of the previous related work is done for the English language. Consequently, many algorithms that are developed for the English language perform poorly when applied to other languages like Arabic, which is highly inflectional and morphologically rich [65, 66]. Some proposed methods and approaches are language-specific like Russian [67], Chinese [68], and Turkish [69]. However, a little published research has been found for the Arabic language like in [23, 24, 25, 26].

3.3.1 Arabic Search Results Clustering

Sahmoudi and Lachkar [23] claimed that the suffix tree clustering algorithm (STC) has never applied for Arabic Web search snippets. Thus, they studied how STC algorithm can be applied to Arabic snippets. Even though they gained promising results, the evaluation they performed is subjective and not objective. The reason behind using subjective evaluation is the lack of standard labeled test collection for the Arabic language [23]. To the best of our knowledge, there is no standard test collection of the Arabic language for evaluating search results clustering. Indeed, this is the main motivation behind building labeled data collection of search results for the Arabic language in this thesis. In another work [24], Sahmoudi and Lachkar proposed an interactive system for Arabic Web search results clustering (ISAWSRC) for Arabic query reformulation. This system enables users, after the systems shows the cluster labels, to click on produced cluster label so that the system can then retrieve more relevant results. A very recent work [70] done by the same authors, studies how to integrate and adapt formal concept analysis (FCA) for Arabic web search results clustering. They performed an experimental study to show that FCA is better than suffix tree clustering and Lingo [10] in terms of both clustering and label quality. They used a dataset of Arabic documents from the Open Directory Project as a benchmark.

Most of the related work in this and previous sections are based on experimental research, which mainly tries to evaluate clustering experiments and give some recommendations for different stages of clustering, especially in the preprocessing stage. This is discussed further next.

3.3.2 Text Feature Selection and Extraction

Feature selection methods have been widely used in many real applications. This includes pattern recognition applications like Object-Based Land Cover Mapping of Unmanned Aerial Vehicle Imagery [71], text categorization, image processing, and many others [27].

One can observe that the main challenge in terms of clustering quality in SRC approach, is how to represent and extract features from search results. Each work related to Web search clustering suggests a particular way of extracting features. For example, the authors of Grouper system [9] suggested to use single words and ordered sequences of words as text features. Lassi authors [22], on the other hand, used lexical affinities, i.e., pairs of words with strong correlation of appearance in the input text (such pairs are said to share a lexical affinity). Lingo authors [10] used flat clustering with frequent phrases (i.e., 2-gram words) as text features. The authors of SRC [72] (a previous add-on to MSN search) suggested to use n-gram of words as text features in their clustering framework.

A recent master thesis [73] evaluated the effect of preprocessing in Arabic documents clustering in the general context, not in the search results context. Its goal was to find the best combinations of these techniques when using clustering algorithm. They used two clustering algorithms K-means and expectation maximization (EM). Their results confirmed that: (1) K-means is suitable for Arabic text clustering and gives better evaluation than EM algorithm. (2) Euclidean distance is more appropriate than Manhattan distance for Arabic text clustering. (3) Applying term pruning with small value for TF enhances the evaluation (minimum TF of 3 gave the best value of evaluation). (4) Term weighting (TF-IDF) enhances the evaluation. (5) Regarding morphological analysis, light stemming is found to be more appropriate than root-based stemming and raw text. (6) Using normalization enhances the evaluation too. These results are almost consistent with other comparative studies [74, 75].

Other studies have been performed to investigate the effectiveness (i.e., clustering quality) of different stemming approaches on Arabic text clustering quality. For example, Ghanem and Ashour [76] showed that light stemming achieved best results of clustering quality in terms of recall, precision and F-measure when compared with others (i.e., root-based and without stemming). Alomari [77], on the other hand, achieved the best results of clustering quality without stemming. From such studies, one can conclude that stemming more likely decreases the effectiveness.

With all these studies attempting to address the clustering of Arabic content on Web, a recent review study done by Alghamdi and Selamat [27] confirms the challenges that face Arabic language. In particular, this includes:

- 1. How to identify significant features?
- 2. How to build a suitable model that results in high-performance clustering model?

This thesis helps fill the first gap by thoroughly studying *feature sources* and *vector* space representations, which gives insights of the best combinations that result in a

high-quality clustering. Moreover, this work mitigates the second challenge by proposing a novel approach to build a supervised clustering model that competes with the popular traditional approach that is purely dependent on the unsupervised learning. This supervised clustering model is based primarily on leveraging search results of clear queries. Additionally, in the light of the lack of published benchmarks of search results clustering for the Arabic, this work builds a complete benchmark that contains different datasets designated for the Arabic.

Chapter 4 Data Collection: AMBIGArabic

One of the important aspects of any experimental research is understanding and collecting the data required for experiments. In order to perform and evaluate experiments of search results clustering, real data from web search engines must be collected. Typically, any data for search results clustering include:

- 1. A set of ambiguous queries.
- 2. A set of meanings for each ambiguous query.
- 3. A set of search results for each ambiguous query.
- 4. A corresponding meaning for each search result (i.e., the labels).

Unfortunately, when we looked for SRC benchmarks, there was no benchmark for Arabic published and publicly available, intended for experimenting with search results clustering. In contrast, English has a number of benchmarks intended for that purpose. The most popular and widely used benchmarks are AMBIguous ENTries (AMBI-ENT)¹ [78] and MORE Sense-tagged QUEries (MORESQUE)² [79]. Both benchmarks were collected and investigated separately. A statistical analysis was performed for the two benchmarks to show how the results are distributed across the meanings of all queries. Figure 4.1 shows how search results are distributed over the meanings of the two ambiguous queries, "Aida" query from AMBIENT and "Stephen king" from MORESQUE³. It was observed that the queries along with their meanings in both benchmarks are selected from Wikipedia disambiguation pages. As shown in Figure 4.1, there are also some queries where their search results do not cover all meanings, thus leaving a lot of search results unlabeled.

The main challenges of building benchmarks of SRC are:

¹Description of AMBIENT dataset and the download link can be found at http://search.fub.it/ ambient/

²Description of MORESQUE dataset and the download link can be found at http://lcl.uniroma1. it/moresque

³The remaining queries can be found here: https://goo.gl/mu2FJM and https://goo.gl/BYy3je for AMBIENT and MORESQUE, respectively

- 1. The feasibility and the limits of fetching search results from web search engines.
- 2. Specifying the meanings for each ambiguous query, given that the nature of meanings or senses is dynamic and varies over time.
- 3. Labeling search results with the collected meanings.

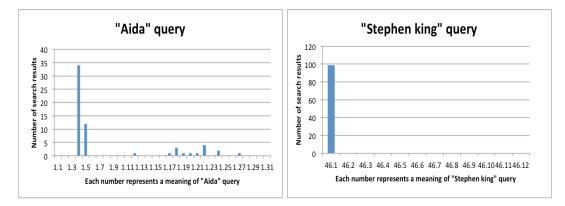


Figure 4.1: Distribution of search results over meanings.

This chapter thoroughly presents the work of building datasets intended for performing search result disambiguation experiments for Arabic language. The feasibility, data design, and search results acquisition are discussed in section 4.1. In this study, meanings were collected with the help of Wikipedia disambiguation pages. Section 4.2 proposes two novel approaches for labeling search results instead of the manual labeling approach. Finally, three core benchmarks are proposed for Arabic: two benchmarks with a gold standard and one benchmark based on blind relevance feedback. The proposed benchmarks for Arabic language (i.e., AMBIGArabic) are described in Section 4.3.

4.1 Toward Building an SRC Benchmark for Arabic

4.1.1 Feasibility Study: Fetching Search Results

One of the early steps in this study was to check the feasibility and limits of fetching search results from the popular search engines like Google, Bing, and Yahoo. Even though the experiments of this study were performed on two engines, Google and Bing, the three engines were investigated in the feasibility study stage. In fact, investigating the additional engine (i.e., Yahoo!) was important because any search engine can block us from fetching search results. Therefore, Yahoo engine was considered as a backup in this study.

4.1.1.1 Google

Google provides a service called Google Custom Search Engine (CSE) [80]. The purpose of this service is that it lets you include a search engine on your web site to help visitors find the information they are looking for. Moreover, it has the option to set it to search the entire web. We had three options to search Google:

- 1. Using the official Google API (e.g., Java client library) with custom search domain.
- 2. Exploiting the URL of custom search engine, requesting a query through a plain HTTP GET method, and then parsing the returned results (HTML scrapping).
- 3. Exploiting the URL of public Google search engine (HTML scrapping).

The first option has some limits like 1000-10,000 requests/day with a free quota of 100 requests only. Additional requests cost \$5 per 1000 requests, up to 10,000 requests per day. The second option seemed to be fine. When trying the third option, Google blocked us as they are able to detect any robot generating unusual traffic from the same network. In the first two options, we can fetch 100 search results per query only though. Therefore, the final decision was to go with the option two i.e., fetching results from Google custom search URL. This required us to create our own domain⁴.

4.1.1.2 Bing

To interact with Bing search engine, Bing was offering a service called Bing Search API [81] with a free quota of 5000 requests/month. Unfortunately, as of December 15, 2016 Microsoft announced that this API will no longer be supported, and they will offer a new cognitive service through their cloud platform⁵ [81].

As another choice, we were able to exploit the public URL of Bing search engine (HTML scrapping). After several trials of fetching from their public URL, it seemed to be fine. We were able to fetch up to 200 results per query.

4.1.1.3 Yahoo!

Over that past years, Yahoo was providing a service called BOSS Search API. After March 31, 2016, they stopped BOSS search API and have provided a service similar to Google CSE, called Yahoo Partner Ads. Its main purpose to make a custom search engine for your site. As with Bing, we were able to exploit Yahoo search URL by building HTML scrapper. It worked fine, and no issues reported.

4.1.2 Data Design

In this section we show what the nature of data is and how data is modeled. The base model designed is a relational model. We have seven core relations. Four core entities

⁴https://cse.google.com/cse/publicurl?cx=011305709239177939329:h3wb8k8xtky

⁵http://www.azure.com/

are related to search results: query, meaning, search result, and search engine, and two core entities are related to user labeling: user and user labeling. In addition, we have the full document (we call it inner page) as a property of search result.

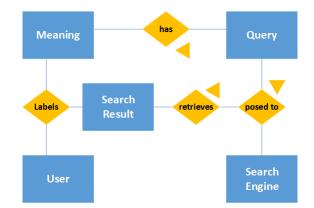


Figure 4.2: A high level entity relationship diagram of data.

Figure. 4.2 abstracts the core entities combined with the main relationships. The *query* table is used to store queries. Since the query could be either ambiguous or clear, the *query* table has a flag *is_ambiguous* to indicate whether the query is ambiguous. The ambiguous query can have multiple meanings. The *meaning* table is used to store the meanings. When posing a query to a search engine, search results are retrieved and stored in the *search result* table. The *user* table is used to store users who can label search results with meanings.

Some of the other entities and relationships (i.e., link tables) are not shown here. For more detailed scheme, please refer to Figure A.1 in Appendix A.

4.1.3 Search Results Acquisition: The Fetcher System

After studying the feasibility of fetching search results from Google, Bing, and Yahoo, the next step was implementing the fetcher system⁶. Based on a given query, this system is responsible for delivering search results, each of which contains a title, a snippet (a short summary), a URL pointing to the full document, and the full document itself⁷.

The fetcher system was implemented, and all the implementation details as well as the source code are available at Spread repository⁸. Moreover, user interfaces were implemented to be able to test the fetcher system.

The high-level components of the data acquisition system (i.e., the fetcher system) are represented in Figure 4.3. The collected queries are loaded by the *data loader* component. The *crawler* component delivers the loaded queries into the *fetcher* components and then passes the search results to *persistence* component for storing the results. The

⁶Some call it data acquisition system.

⁷Not all sites allow you to fetch their inner pages. That's why there are some fetched search results without inner pages

⁸https://github.com/haytham-salhi/Spread

controller component gets the loaded queries from the *data loader* component and passes them to the *crawler* component to start fetching the search results.

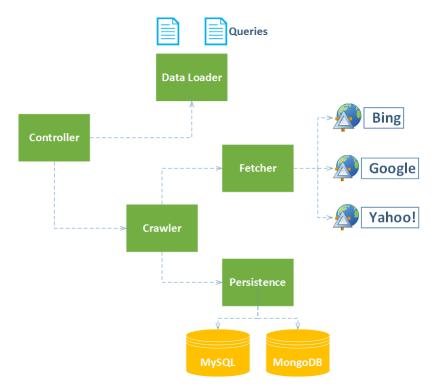


Figure 4.3: A high level component diagram for data acquisition system.

4.1.4 Characteristics of Search Results

After collecting an initial set of queries, we then looked into search results returned by the search engines, Google and Bing, and the following characteristics/issues were found:

- A query can refer to instances of the same entity and/or instances of different entities. As an example, the query آرمسترونج can refer to different entities of person class and even different entities of location class.
- A search engine can return results for specific subset of meanings or senses (not all senses). For example, if we query python on Google, most likely it would return the first 100 results about python as a programming language. So the assumption that might come to mind at first that a search engine would always return results (Say top 100) covering all meanings, is not correct.
- When searching for something in a web search engine, the search engine might return documents that have the whole query words or a portion. As an example, the query العربية might return results that contain الجربية only.

We might think that if some query in Wikipedia disambiguation pages is disambiguated for persons only, then the search engine would return results for those persons only. That is not correct, a search engine might return results for other entities as well. The query عبد العزيز عبد العزيز, for example, can refer to persons or universities, or something we do not know about currently. In other words, new meanings or senses can show up over time. This is the reason at some point why you should specify the meanings explicitly for evaluation purposes.

4.2 Search Results Labeling

One important aspect of the benchmark is the data labeling. In fact, it represents one of the core challenges in this study where no Arabic datasets available for search results clustering. What researchers usually do is assessing the results by the help of humans. More often, however, the idea of hiring assessors is expensive and time consuming. This section defines the proposed labeling approaches and shows how the manual labeling was performed in this study.

4.2.1 The Proposed Approaches

This subsection presents two novel approaches for data labeling: *intersecting* and *mixing* approaches. Exploiting the search engine judgment and querying the meanings (i.e., the formulated clear queries) are the main motivation behind these two approaches.

4.2.1.1 Intersecting Approach

Formal Definition To disambiguate an ambiguous query q, which has different meanings/senses $S = \{s_1, s_2, ..., s_n\}$, using a search engine SE:

- 1. Fetch the results R_q for q, so we have $R_q = \{r1, r2, ..., r_m\}$ where m is the maximum number of search results that could be fetched, and r_i is the *i*th search result.
- 2. Fetch the results for each clear query (that is formed by combining q and s_i)⁹ where $1 \leq i \leq n$, so we have: $R_{q(s1)} = \{r_{s11}, r_{s12}, ..., r_{s1j}\}$... until we reach $R_{q(sn)} = \{r_{sn1}, r_{sn2}, ..., r_{snk}\}$, where $0 < j, k \leq m$, and $R_{q(si)}$ is the list of search results of the clear query formed by q and s_i .
- 3. Annotate the search items as follows: \forall item $\in (R_q \cap Rq_{(s_i)})$, annotate it with s_i .

This approach was looked into by developing an interface for testing it for different search engines. A snapshot of this interface is available here¹⁰. Moreover, some statistics and charts were generated to show some insights of intersections between search results of

⁹For example, say we have $q = \frac{1}{2}$ and $s1 = \frac{1}{2}$, then the resulting clear query is $\frac{1}{2}$.

¹⁰https://goo.gl/DTEszH

meaning and search results for an ambiguous query. Table 4.1 shows these statistics for some queries. The full sheet can be found here¹¹.

Query	Meaning	Formulated Query	Google Retrieved Results	Google Intersections	Bing Retrieved Results	Bing Intersections
المالكي		المالكي	100		200	
	المذهب	المذهب المالكي	100	2	200	24
	نوري المالكي	نوري المالكي	100	15	200	24
	مراد المالكيّ	مراد المالكيُّ	100	2	200	1
	فايز المالكي	فايز المالكي	100	3	200	6
عمان		عمان	100		200	
	سلطنة	سلطنة عمان	100	33	200	51
	مدينة	مدينة عمان	100	6	200	26
أمازون		أمازون	100		200	
	نهر	نهر أمازون	100	4	200	5
	نهر شرکة	شركة أمازون	100	23	200	49
البقرة		البقرة	100		200	
	حيوان	حيوان البقرة	100	4	200	6
	سورة	سورة البقرة	100	74	200	93

Table 4.1: The intersections between results of ambiguous query and results clear queries.

4.2.1.2 Mixing Approach

The idea of mixing approach is slightly different. It is based on collecting the search results for the meanings (i.e., formulated clear queries) first.

Formal Definition For an ambiguous query q, which has different meanings/senses $S = \{s_1, s_2, ..., s_n\}$, and using a search engine SE:

- 1. Fetch the results for each clear query (that is formed by combining of q and s_i) where $1 \le i \le n$.
- 2. Label the top N results¹² for each $R_{q(si)} = \{r_{si1}, r_{si2}, ..., r_{sij}\}$ with s_i , where $1 \leq i \leq n$, and $R_{q(si)}$ is the list of search results of the clear query formed by q and s_i .
- 3. Mix the labeled results from above together with the query q.

¹¹https://goo.gl/8VW8eM

¹²The value of N depends on the desired size of the dataset you want to make.

4.2.1.3 Discussion of Approaches

Starting with the *intersecting approach*, even though a search engine tries its best to retrieve relevant results as a response to a clear query, some (usually few) items can be non-relevant.

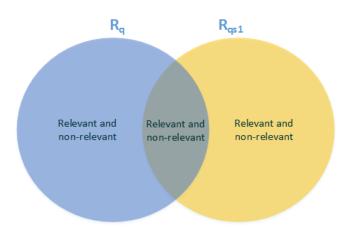


Figure 4.4: A Venn diagram showing the two sets: R_q , R_{qs1} .

Looking at Figure 4.4, let us try to cover all possibilities which might happen when intersecting R_q with $R_{q(s1)}$:

- R_q (i.e., the set of search results of ambiguous query) can contain relevant and non-relevant results to s_1 .
- $R_{q(s1)}$ (i.e., the set of search results of the meaning s_1) most likely contains relevant results to s_1 . However, it might contain non-relevant results to s_1 (usually few if any).
- When intersecting the two sets R_q and $R_{q(s1)}$, the output of intersection could be:
 - Relevant to s1 (as a result of relevant and relevant), which is fine.
 - Non-relevant to s1 would incorrectly be annotated as s_1 (as a result of non-relevant and non-relevant). They should be very few though. This is an **issue**! (One could try to add additional conditions along with the intersection to avoid this case as much as possible).
 - The cases (relevant and non-relevant) and (non-relevant and relevant) are impossible of course and would not happen (because we are taking the intersection).
 - Relevant items to s1 exist in R_q and do not exist in $R_{q(s1)}$ would not be labeled as s1. This is an **issue**! (They should be few; the items that are not annotated must not affect the evaluation!)

Although the *intersecting approach* is interesting for different purposes, it cannot be adopted alone in the labeling process. This is because not every search result will be labeled as justified above in 4.2.1.1.

In the *mixing approach*, on the other hand, we get rid of the drawback of the intersecting approach by ensuring that each query has all search results labeled. Furthermore, the results are now more representative and we ensure that the search results of a query cover all meanings.

As a first step, we started collecting ambiguous queries. Then the next job was to look into data and start building the benchmark.

4.2.2 Human Relevance Assessment

As mentioned earlier, the assumption that all search results for some query are always relevant is not true. That is why using mixing approach alone is not sufficient for building a ground truth. In order to build benchmarks with a gold standard judgment of relevance, a human relevance assessment interface was developed for enabling a group of users to label search results manually, thus helping the process of building the gold standard or ground truth.

This interface supports two types of manual labeling:

- Yes/no annotation.
- Choices-based annotation.

In yes/no annotation strategy, an assessor indicates, for a specific information need expressed by a query, whether a search result is relevant to the information need. If the search result is judged relevant, the user selects yes; otherwise, no would be selected. Figure 4.5 shows the yes/no annotation interface for a specific query, along with its search items and choices.

	or not. Finally, click
do NOT press Submit twice; uploading your response may take time!	
نهر أمازون Search Results of	
Search Item	Relevant?
نهر الأمازون - ويكيبيديا، الموسوعة الحرة	
نير_الأمازرين/https://arwikipedia.org/wiki/ تعريف المرابع المعلم من حيث المجم والعمق، حيث ان فهر النيل يحتل المرتبة الأولى من حيث الطول، الأمرُّزون أو الأمازُون نهر يقع في أمريكا الجنوبية. وهو ثاني أكبر نهر في العالم من حيث المجم والعمق، حيث ان فهر ا ومن حيث محل التنافق	_Yes_No
YouTube - أفعى الأناكوندا تتقيأ بقرة في نهر الأمازون بالبرازيل	
https://www.youtube.com/watch?v=J3gkjvSJ6rA كانون الأول (ديسمبر) 2012 مقطع فيدير لأقمى الأنكوندا تظهر فيه وهي تتقيا بقرة وتلفظها في النهر بعد أن أيتاحها بالكامل في منطقة عابات الأمازور 27 بالشمال البرازيلي	(Yes()No
أين يقع نهر الأمازون - موضوع	
اين يقع نبوالأماز ردن/mawdoo3.com/ اين يقع نبوالأماز ون ر (مارس) 2015 ويعتبر حرض تصريف نير الأمازون أكبر أحراض تصريف الأنهار في العالم، كما أنّ ترتيبه الثاني بين أنهار المالم من حيث محلّ فكُق 2 مياهه بد نير النيل	Yes No]آذا
- نهر الامازون - YouTube	
https://www.outube.com/watch?v=PALNzR3-y_w غاتي الأول (ديسر) 2014 ين ي كلين الأول (ديسر) 2014 ين ي ما 2012 ي لائين الأول (ديسر) 2014 ي	_Yes_No

Figure 4.5: An example snapshot of yes/no interface.

Yes/no annotation strategy was used to build a gold standard of the mixing-based benchmark. In particular, this type of benchmark is built primarily using clear queries. The mixing-based benchmark is discussed further in Section 4.3.

The second type of the labeling used in this manual process is *choices-based annotation*. This strategy was used to label search results of a query with a predefined set of meanings. In other words, the user selects, for each search result, one meaning only from the predefined set of meanings, indicating the sense of that search result. If the search result has sense other than the predefined ones, no selection will be made. Figure 4.6 shows the choices-based annotation interface for a specific query, along with its search items and its choices that represent its meanings.

Io, Haytham! ch search result below, please indicate whether it is semantically relevant to the query and of this page. are do NOT press Submit twice; uploading your response may take time!	or not. Finally, click
جر ار Search Results of	
Search Item	Meaning?
جرار زراعي – ويكيبيديا، الموسوعة الحرة جرار غائبة الموانية الموسوعة الحرة مند المقالة ربما تمتاج لتهذيب لتتنامب مع دليل الأسلوب في ويكيينيا. لم يُحدد أي معبد لتهذيب	⊖Tractor⊖ Bassam Jarrar
جرار (عائلة) - ويكيبيديا، الموسوعة الحرة (جراراع ^{لتل} ه/ktps://ar.wikipedia.org/wiki/عنام عائلة جزار أو ال جزار عائلة فلسطينية. ينتمي أفرادها بشكل رئيسي إلى قرى محافظة جنين في	⊖Tractor Bassam Jarrar
جرار - قاموس WordReference.com جرار - قاموس http://www.wordreference.com/aren/جرار + المرار Heglish: Arabic: tractor n noun: Refers to person, place, thing, quality, etc. (farm vehicle) جزار، تلراكترر drives an old	⊖Tractor⊖ Bassam Jarrar 9
الشيخ بسام جرار https://www.facebook.com/pages/209764045712475/ https://www.facebook.com/pages/209764045712475/ الشيخ بسام جرار	⊖Tractor⊖ Bassam Jarrar
الشيخ بسام جرار فيسبوك	Tractor

Figure 4.6: An example snapshot of choices-based interface.

Choices-based strategy was used to build a gold standard of the plain humanannotated (HA) benchmark, which basically contains real search results of ambiguous queries. The plain benchmark is discussed further in Section 4.3.

4.3 AMBIGArabic Benchmarks

This section presents the three benchmarks that were built during the thesis work. They are called AMBIGArabic Benchmarks (which is a shortcut for Ambiguous Arabic Benchmarks). Two of these benchmarks (i.e., mixing-based and plain benchmarks) are made with a gold standard, and one benchmark is based on the blind relevance feedback.

4.3.1 Mixing-based Human-annotated Benchmarks

As the name suggests, this benchmark is based on the mixing labeling approach discussed in Section 4.2.1.2. Leveraging the search results of clear queries to build datasets is very useful for experiments.

Since it is important for some types of experiments and metrics to have balanced datasets, the desired goal of this benchmark is to have datasets containing a set of queries, each with *balanced* search results of more than one meaning. That is, if a query has two meanings, then the search results of the first meaning and the search results of the second meaning will be combined together. In other words, all meanings of a query will be equally represented.

To build this benchmark, the following steps were followed:

- 30 ambiguous queries were collected with their meanings. From the meanings, 63 clear queries were formed. The full list of queries and meanings are shown in Table C.1 in Appendix C and can be found online here¹³.
- 2. After forming the clear queries, search results were fetched for both engines, Google and Bing. In particular, 100 search results were fetched for Google, and 200 search results were fetched for Bing.
- 3. After that, yes/no annotation labeling was performed by humans on the clear queries in order to produce datasets (i.e., queries) with equal sizes of relevant search results belonging to different meanings. The final judged results can be found one here for Google¹⁴ and Bing¹⁵.

The mixing-based benchmark consists of the following:

- 1. 30 ambiguous queries along with their meanings (between two and three for each query).
- 2. The top 30 human-judged relevant search results for each clear query (formed using the meaning), along with their titles, snippets, and inner pages. That means, if an ambiguous query has two meanings, it would be 60 (30 + 30) search results. The lowest common value among the queries is 30; that's why that number is selected.
- 3. The human labels for all search results.

Some statistics about human judgment giving information like number of judges were calculated. This is shown in Table C.3 in Appendix C.2 for Google as an example. They are also available online for Google^{16} and Bing^{17} .

4.3.2 Mixing-based BRF-annotated Benchmarks

Blind Relevance Feedback (BRF), also referred to as pseudo relevance feedback, is one of the types of relevance feedback used in information retrieval systems. The idea behind blind relevance feedback is to assume that the top k ranked results are relevant to the query, without user intervention [82]. In this study, this was seen as an opportunity to check how useful the blind relevance feedback could be in search results clustering, when using it for labeling search results.

To build this benchmark, the same procedure as above benchmark was followed except in the third step. In the third step, the top 50 search results were assumed to

¹³https://goo.gl/UcSkkE

¹⁴https://goo.gl/KRBvsB

¹⁵https://goo.gl/epg2Ct

¹⁶https://goo.gl/jjcR2J

¹⁷https://goo.gl/v4xadq

be relevant to their query, producing datasets with equal sizes of relevant search results belonging to different meanings.

The BRF-based benchmark basically contains the same elements as above but with different size of search results because the top 50 ranked search results (assumed as relevant) were collected for each clear query. That means, if an ambiguous query has two meanings, it would have 100 (50 + 50) search results.

4.3.3 Plain Human-annotated Benchmarks

In fact, a search results disambiguation system would work on real search results of an ambiguous query. Out of this need, benchmarks of search results of ambiguous queries were built.

To build this benchmark, the following procedure were followed:

- 1. A subset composed of 11 and 15 queries¹⁸ were chosen for Google and Bing, respectively, on the basis that they have reasonable search results belonging to more than one meaning of predefined meanings. Each subset, for Google and Bing, has three queries with three meaning. The remaining queries has two meanings for each.
- 2. For each query, 100 search results for Google and 200 search results for Bing were fetched. Regarding inner pages, not all sites allow you to crawl their web pages. However, inner pages for most search results were successfully fetched. The fetcher component was capable of fetching inner page for most search results. For Bing, the fetcher was able to crawl 2822 inner pages out of 3000 search results. For Google, the fetcher was able to crawl 1033 out of 1100.
- 3. After that, all search results were labeled manually using the developed assessment interface. The annotation process is choices-based selection. As an example, *sakhr* has three senses: company, sakhr bn amro, or stone, as shown below.

The plain benchmark now consists of the following:

- 1. 11 ambiguous query for Google and 15 queries for Bing along with their predefined meanings (between two and three for each query).
- 2. The top 100 ranked search results for Google and the top 200 ranked search results for Bing.
- 3. The human labels for search results.

The final judged results can be found here for Google¹⁹ and Bing²⁰. Some statistics about human judgment are shown in Table C.4 for Google and in Table C.5 for Bing.

¹⁸They can be found here: https://goo.gl/SrBBWf

¹⁹https://goo.gl/VFebSk

²⁰https://goo.gl/dZm3jk

They can be found online for $Google^{21}$ and $Bing^{22}$ as well.

Table 4.2 and Table 4.3 summarize the three benchmarks in terms of size of queries, size of search results, and labeling method used. All the benchmarks above can be downloaded for use from this online location 23 .

Benchmark	Google queries	Bing queries	Google clear queries	Bing clear queries	Labeling method
Human-annotated mixing-based	30	30	63	63	Mixing-based approach with human
BRF mixing-based	30	30	63	63	Mixing-based approach with relevance feedback
Plain	11	15	25	33	Human

Table 4.2: Size of queries and labeling method for each benchmark.

Table 4.3: Size of search results per query for each benchmark.

Benchmark	Search results per query/Google		Search results per query/Bing		
	Queries withQueries with2 meaning3 meanings		Queries with 2 meanings	Queries with 3 meanings	
Human-annotated mixing-based	60	90	60	90	
BRF mixing-based	100	150	100	150	
Plain	Plain 100		200		

²¹https://goo.gl/dsp4zh ²²https://goo.gl/658ftd

²³https://github.com/haytham-salhi/Spread/tree/master/datasets

Chapter 5

Experimental Design and Methodology

This chapter presents the complete design and mechanism of the experiments that were performed. The first section shows the experiments that investigate the influence of feature sources and feature representations on the effectiveness of search results clustering. It starts with the research hypothesis. Then it shows the independent variables and their treatments as well as the other neutralized variables. Finally it discusses how these experiments are executed and evaluated.

The second section presents the design of how an supervised approach could be utilized in unsupervised learning and how such approach could be executed and evaluated.

5.1 Influence of Features

The first type of experiments is concerned with the study of the influence of feature source and feature extraction on the effectiveness of search result clustering. Particularly, it explores whether there is a significant difference between feature sources (i.e., title, snippet, title with snippet, and inner page) and feature space representations (i.e., single words, phrases, single words with 2-grams, single words with 2-grams and 3-grams) on the effectiveness by performing several experiments on our benchmarks such as human-annotated, BRF-annotated, and plain benchmarks. Moreover, it investigates how useful blind relevance feedback could be in search results clustering. The main goal of using the blind relevance feedback is to see whether it supports results in other experiments (i.e., human annotated).

5.1.1 Research Hypotheses

This study has two main hypotheses. The goal is to support the alternative hypothesis by rejecting the null hypothesis.

• Null hypothesis: There is no influence of different feature sources and feature

space representations on the effectiveness of Arabic search results clustering measured by the F-measure of clustering.

• Alternative Hypothesis: There is a significant influence of different feature sources and feature space representations on the effectiveness of Arabic search results clustering measured by the F-measure of clustering.

5.1.2 Dependent Variable

As we focus on one of the important requirements of search results clustering, effectiveness is considered as the dependent variable of this study and is measured by the F-measure of search results clustering.

5.1.3 Independent Variables of Interest

The main independent variables that were investigated through this study are related to text feature engineering:

- **Feature Source**: This variable is very important as it represents the source where the features are extracted from. This variable has the following conditions:
 - 1. Title only.
 - 2. Snippet only.
 - 3. Title with snippet.
 - 4. Inner page (Full document text).
- Feature Space Representation: This is another important variable that represents how the text features are represented in a vector space model. This variable has the following conditions:
 - 1. Single words.
 - 2. Phrases of 2-grams.
 - 3. Single words with phrases of 2-grams.
 - 4. Single words with phrases of 2-grams and 3-grams.

5.1.4 Neutralized Variables

There are many other variables that might affect the performance of search results clustering but which are not factors of interest in this study. To make our experiments valid, the other variables were neutralized as much as possible. Most other variables can be categorized into three categories: data (feature) preprocessing, feature representation, and clustering algorithm. Furthermore, we have a variable related to the raw data, which is the size of search results per query.

5.1.4.1 Data Preprocessing Variables

The variables related to data preprocessing with their values as well as the rationales are discussed below.

- 1. Variable: Stemming.
 - Value: Light Stemming.
 - *Rationale*: Generally, stemming is a good practice for the variations of the same word. When performing stemming, more than one word with different meanings can be mapped to one stemmed word. Thereby, while stemming can improve recall in some cases, it can hurt precision slightly. Moreover, studies [76, 73] for Arabic language have shown that the light stemming is better than the root-based stemming or null stemming (i.e., without stemming) in text clustering.
- 2. Variable: Ambiguous query words.
 - Value: To be removed.
 - *Rationale*: In dry runs of some experiments, we noticed that the ambiguous query terms can considerably affect the quality of search results clustering. The reason behind that is that the similarity of documents largely depends on word weights. Therefore, an ambiguous word with a high weight in two documents can result in high similarity between these two documents, while in fact they are not similar because that word has different meanings in each document. This result has been noted as well by Caruso et al. [83] but in a different context.
- 3. Variable: Letter normalization.
 - Value: To be normalized.
 - Rationale: We believe that a few letters in Arabic are rather equivalent (including alif normalization, taa marbouta normalization, alif maqsoura normalization, and tatweel normalization like أمازون). Normalizing such letters in Arabic is important where the same word can be written with a slight modification. As an example, the word of a be found written as مكتبة The two words are exactly the same meaning.
- 4. *Variable*: Diacritics.
 - Value: To be removed.
 - Rationale: Diacritics feature is one of the additional dimensions that increases the complexity of Arabic language. While diacritics can affect the word meaning in Arabic (like عَمَان and عَمَان), Arabic words are rich of inflectional suffixes and prefixes so that one word with the same meaning can have many inflectional forms. Therefore, diacritics are often removed.
- 5. Variable: Punctuation marks.

- Value: To be removed.
- *Rationale*: Anything related to punctuation marks such as periods, commas, and semicolon, are removed. They have no value and are useless in the bag-of-words model.
- 6. Variable: Non Arabic words.
 - Value: To be removed.
 - *Rationale*: Since this study focuses on Arabic text, non-Arabic words are removed.
- 7. Variable: Numbers (numeric digits).
 - Value: To be removed.
 - *Rationale*: Including numbers and digits as features increases the space dimensionality. Furthermore, since we deal with queries of words, they are useless to keep the numeric digits.
- 8. Variable: Non alphabetic words.
 - Value: To be removed.
 - *Rationale*: Non alphabetic words might present noise in the analysis, and it is prudent to remove them.
- 9. Variable: Stop words.
 - Value: To be removed.
 - *Rationale*: Stop words are those words occurring frequently in any language. Since they are not very discriminative features for information retrieval and mining applications, it is often recommended to remove them [33].

The preprocessing steps are performed in the following order:

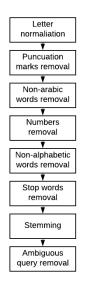


Figure 5.1: The order of the preprocessing steps.

Additionally, before removing the ambiguous query, it is entered through the letter normalization and then the stemming stages only.

5.1.4.2 Feature Representation Variables

The other variables that are related to features representation, with their values as well as the rationales, are discussed below.

- 1. Variable: Word frequency.
 - Value: To be used.
 - *Rationale*: Word frequency is important as it indicates how relevant this document is to that word. Therefore, it will significantly affect the similarity computation between search results.
- 2. *Variable*: Words to keep: the top most common words in all the string attribute values to keep, plus any words that are as common as the least common word amongst the top ones.
 - Value: Here the value depends on the case as follows:
 - In case of inner page (i.e., full document): 300 words
 - In case of title and snippet: Since both engines, Google and Bing, generate different lengths of title and/or snippet and to make this neutralized as much as possible, this factor was calculated with same equation for both engines, based on statistics related to the number of words and terms as follows:

$$wordsToKeep(engine) = \frac{T}{R}$$
 (5.1)

where T: total number of terms detected in title and snippet for all results of all ambiguous and clear queries.

R: number of search results that have terms for all ambiguous and clear queries.

Based on the above equation, the calculated value is **25** for Google and **17** for Bing. Notably, Bing snippets are shorter than Google ones. As for the mix of Google and Bing, the average of the two was taken, which is **21**.

• *Rationale*: The idea of words to keep is to attempt to keep the top-N most common words among the lexicon (i.e., the dictionary). Otherwise, all words will be kept. Since the title and snippet of search results are small text, we choose a small number of words to keep. For inner pages, in contrast, we choose a larger number since it is more likely to contain more words. The values above were calculated based on some statistics related to number of words and terms of the search results of search engine. The detailed calculations and statistics can be found in Appendix B.

- 3. Variable: Words frequency damping.
 - Value: Not used.
 - *Rationale*: As previously mentioned, repetition of the same word in the document considerably affects the similarity computation. However, to provide more stability to the similarity computation, a damping function is often applied. However, Aggarwal and Zhai [62] pointed out that clustering have shown better performance without damping, especially if the underlying data sets are relatively clean and contain no or few spam documents.
- 4. Variable: Inverse document frequency.
 - Value: To be used.
 - *Rationale*: The informative words are those words occurring frequently in a document but infrequently across documents. This is the idea behind using this type of normalization.
- 5. Variable: Minimum word frequency to keep.
 - Value: 1.
 - *Rationale*: Since the preprocessing of search results removes the noises, there is no plausible reason to remove the words whose frequencies are less than a specific value. In other words, all words with frequencies larger than 1 will be kept.
- 6. Variable: Feature vector length normalization.
 - Value: To be used.
 - *Rationale*: It is important to normalize the documents so that similarity computations are correct and reasonable. The reason is discussed in the rationale of distance function variable in the next subsection.

5.1.4.3 Clustering Algorithm Variables

The variables related to the machine learning clustering task, which are used to cluster search results, are discussed below.

- 1. Variable: Clustering algorithm.
 - Value: K-means algorithm.
 - Rationale: K-means¹ is one of K-family clustering algorithms, which form the basis for other types of clustering algorithms. K-means is a good choice for a wide range of information retrieval tasks [1]. It has been shown that such algorithms (like K-means and K-medoids) are very appropriate for text clustering [74, 73]. Moreover, K-means tends to converge very quickly in

 $^{^{1}\}mathrm{Detailed}$ description of the K-means algorithm can be found in the Background chapter (Chapter 2).

practice [1] and this was observed while running some dry runs. K-means is also more efficient than hierarchical clustering algorithms. In particular, implementations of K-means require O(KN) time complexity, while hierarchical algorithms require $O(n^2)$.

- 2. Variable: Number of clusters (K).
 - Value: It depends on the experiment itself as follows: for most experiments it is set to the *number of predefined meanings* of an ambiguous query. Only for experiments that are performed on plain benchmarks to study the influence of the desired factors it is set to best value according to Calinski-Harabasz criterion [84].
 - *Rationale*: As we deal with queries with predefined meanings, the number of such meanings are known, thus the best value of K can be determined early. However, this study includes experiments that deal with dynamic determination of K, by using Calinski-Harabasz method [84]. A study [85] shows that silhouette and Calinski-Harabasz methods are amongst the best for determining K dynamically. Moreover, Calinski-Harabasz is widely used in cluster validity and is supported by Weka.
- 3. Variable: Distance measure function.
 - Value: Euclidean distance.
 - *Rationale*: As search results clustering deals with text, the most appropriate choice for the similarity (distance) function is the cosine similarity [33]. Therefore, the Euclidean distance function is used for the normalized document lengths. It is worth noting that an interesting property of Euclidean distance is that, if applied to normalized vectors, it will give you the same ranking of similarity as the cosine does [86].
- 4. *Variable*: Initialization strategy for choosing seeds (centroids).
 - Value: Kmeans++.
 - *Rationale:* K-means method aims at finding the clustering that minimizes the intracluster variance of instances (i.e., the sum of squared distances between each data point being clustered and its cluster centroid). However, it is NP-hard problem to find the globally optimal solution. To avoid possible poor clustering, Kmeans++ was proposed as an approximation algorithm for this problem (i.e., optimization problem) [87].
- 5. Variable: Seed.
 - Value: 10.
 - *Rationale*: This number is used for randomization when the random mode is selected for the initialization strategy. However, this value has no direct effect because the initialization strategy is Kmeans++ and not at random. The default value is kept.

- 6. Variable: Replacing missing values with mean/mode.
 - Value: Not used.
 - *Rationale*: We deal with highly sparse data; therefore, it would be impractical to replace every missing value with the mean/mode.
- 7. Variable: Max number of iterations.
 - Value: 500.
 - *Rationale*: The default value is kept. From the preliminary results, the algorithm converged with a few number iterations (between 2 and 10 iterations). Thereby, it has no direct effect, and it is safe to keep the default value as is.

5.1.5 Mechanism

The subjects in terms of experimental research in this study (i.e., the objects to which we apply the experiment conditions) are the ambiguous queries along with their collected search results. The flowchart in Figure 5.2 abstracts the main procedure of experiments, which starts from line #8 on the left side of the same figure.

Given the factors of interest and the neutralized variables, each of these ambiguous queries along with its search results and its meanings were used as input to that experiment procedure, depending on type of benchmark. In this part of study (i.e., concerned with the influence of feature sources and feature space representations), all type of benchmarks were used.

The left side of Figure 5.2 shows the main steps that were followed when running the experiments. This procedure was applied first on mixing-based human-annotated benchmarks including Google, Bing, and mix of Google and Bing. For each of these benchmarks, the number of ambiguous queries is 30. Each of these queries has a number of search results dependent on the number of its predefined meanings. The base number of search results per meaning is 30 as well².

Then it was applied on BRF-based benchmarks including Google, Bing, and mix of both. In BRF-based experiments, the base number of search results (i.e., per meaning number) was changed just to check whether changing data size would affect the performance. This was achieved by running the experiments against 10, 20, and 30 data sizes.

Finally, experiments of this procedure were run for plain benchmarks including Google and Bing, separately. The core difference in procedure between the runs of these experiments and the runs of previous experiments is in determining number of clusters (K). In previous experiments, K is determined based on the number of meanings. In these experiments, K is dynamically determined using Calinski-Harabasz criterion [84] instead.

 $^{^{2}}$ That is, if we have a query with two meanings, then this query would have 30 search results for meaning1 plus 30 search results for meaning2, which is equal to 60 search results

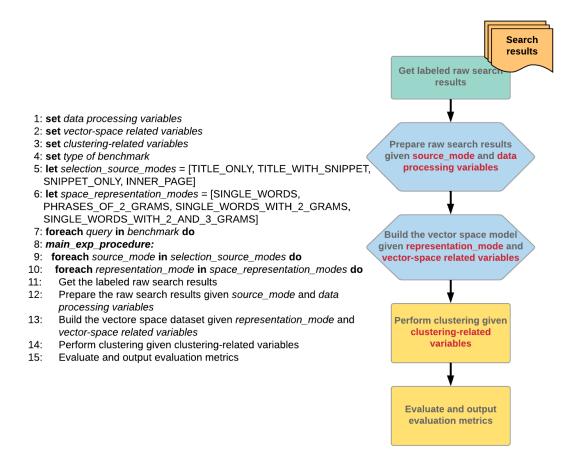


Figure 5.2: A pseudocode with a flowchart of the main steps.

5.1.6 Evaluation Methodology

Cluster evaluation is generally a challenging task. In this study, human assessors participated in building ground truth benchmarks by manually labeling search results. This point was the main motivation of evaluating experiments objectively. Thereby, this study followed an objective external evaluation method to leverage the manual process of labeling that was done when building benchmarks.

The external evaluation method followed in this study is the classes-to-clusters method [31]. In a nutshell, the idea is to find the minimum error assignment class labels to clusters, with the constraint that a class label can be assigned to one cluster only.

So for each single dataset (i.e., within a benchmark) that includes an ambiguous query, predefined meanings, and search results, the classes in this case are represented by the predefined meanings. As an example, for the query Amazon (\hat{l}), the classes in this case are river (\hat{r}) and company (\hat{r}).

After mapping classes to clusters, the popular evaluation metrics were calculated by first calculating the confusion matrix. These metrics³ include:

- Accuracy.
- Weighted precision.
- Weighted recall.
- Weighted macro F-measure.
- Averaged macro F-measure.
- Averaged micro F-measure.

As shown in the pseudocode in Figure 5.2 and after executing the main procedure for all queries, each query would have the values for all above evaluation metrics. However, because the dependent variable of these experiments is the effectiveness of search results clustering, the weighted macro F-measure, which is a harmonic mean of precision and recall, is used to measure the effectiveness of search results clustering.

After having all values of effectiveness for all subjects (i.e., queries) and for all independent variables (i.e., feature source and feature representation mode) and to judge the hypotheses, we need to check whether there is a significant difference between the conditions and try to find the best combination that results in best effectiveness.

Since the design of experiments is two-way with two within-subjects factors (i.e., within-group design and number of independent variables are two), this was done as follows:

- The data of conditions were subjected to normality test, knowing that it is very hard to expect that any sampled data would have precise properties of a probability distribution such as normal distribution.
- Then the data were subjected to a significance test. In particular, the significance test used is the repeated measures ANOVA test (F-test).
- A boxplot analysis was performed to depict the data distribution for each condition and to calculate F-measure values including mean, 25th percentile, 50th percentile (median), 75th percentile, minimum, and maximum.
- PostHoc, a pairwise comparisons test, was used to determine which particular conditions differ from which other conditions test.
- The best combination of conditions was found by using the mean and median together as well as the significance test.

³The definitions of the evaluation metrics can be found in the Background chapter (Chapter 2).

5.2 Supervised Approach to Unsupervised Learning (SAUL): A Proposed Approach for Search Results Clustering

This section shows the design of experiments comparing between the traditional approach and the proposed approach for disamiguating real search results of an ambiguous query. While the traditional approach is unsupervised and dynamically clusters search results, the proposed approach leverages the power of supervised datasets in unsupervised learning, with the help of the notion of blind relevance feedback. It is worth noting that since these experiments work with real search results of ambiguous queries, plain benchmarks are the main theme of the datasets used in this work. Moreover, the *evaluation* of this type of experiments is still challenging. This is mainly because we deal with datasets that might contain search results that do not belong to any of predefined meanings, leaving some search results unlabeled.

5.2.1 Traditional Approach: Dynamic Clustering

This approach represents the traditional work of disambiguating search results of an ambiguous query using clustering. For the sake of comparison, a baseline approach is implemented to be compared with the proposed approach. This baseline approach is challenged by two factors:

- Determining the number of meanings; thus, number of clusters (i.e., the K value of the algorithm).
- Evaluating against training datasets that are manually labeled using predefined meanings. Moreover, these datasets contain results that do not belong to any predefined meanings, or equivalently have no labels.

The first point was addressed by using a popular method for determining K dynamically, called Calinski-Harabasz criterion [84]. A comparative study [85] shows that silhouette and Calinski-Harabasz methods are amongst the best. Moreover, the Calinski-Harabasz method is widely used in cluster validation and is supported by Weka.

All other parameters such as those related to data preprocessing, feature representation, and clustering algorithm were set to the same ones as described previously in Section 5.1.4.

The details of how the evaluation was performed for this approach are discussed later in Section 5.2.3.

5.2.1.1 Mechanism

The plain benchmarks were used for this approach, including Google and Bing. These benchmarks are composed of 11 and 15 ambiguous queries for Google and Bing, respectively. For each search engine, the steps shown in Figure 5.3 were performed.

- 1: set data processing variables
- 2: **set** vector-space related variables
- 3: set clustering-related variables
- 4: **let** *selection_source_modes* = [TITLE_ONLY, TITLE_WITH_SNIPPET, SNIPPET_ONLY, INNER_PAGE]
- 5: **let** space_representation_modes = [SINGLE_WORDS, PHRASES_OF_2_GRAMS, SINGLE_WORDS_WITH_2_GRAMS, SINGLE_WORDS_WITH_2_AND_3_GRAMS]
- 6: foreach query in ordinary_based_benchmark do
- 7: main_exp_procedure:
- 8: foreach source_mode in selection_source_modes do
- 9: foreach representation_mode in space_representation_modes do
- 10: Get the labeled raw search results
- 11: Prepare the raw search results given *source_mode* and *data processing variables*
- 12: Build the vectore space dataset given *representation_mode* and *vector-space related variables*
- 13: Determine number of clusters using *calinski-harabasz* criterion
- 14: Perform clustering given clustering-related variables
- 15: Evaluate and output evaluation metrics

Figure 5.3: A pseudocode describing the main steps of the plain experiments.

After performing the clustering step for each ambiguous query, the evaluation metrics were computed and stored for later analysis.

5.2.2 A Supervised Approach to Unsupervised Learning (SAUL)

This thesis proposes an approach that takes advantage of the models that were built using clear queries. More specifically, the idea is to treat these models as supervised learning models and use them to classify new unseen search results of ambiguous queries. This approach was applied separately on both Google and Bing search engines. What makes this approach more challenging is how it will be evaluated. This approach was evaluated using the same methodology used for the traditional approach. The details of how the evaluation was performed are discussed later in Section 5.2.3.

As the initial clustering model is built using the training dataset (i.e., search results of clear queries), the number of clusters (K) needs to initially be determined. For example, if Amazon query (أمازون) has two meanings: river (ج) and company (شركة), then the clear queries are amazon company (شركة أمازون) and amazon river (نهر أمازون). Therefore, for the initial clustering model built for Amazon, K will be set to 2. All other parameters such as those related to data preprocessing, feature representation, and clustering algorithm were set to the same ones as described previously in Section 5.1.4.

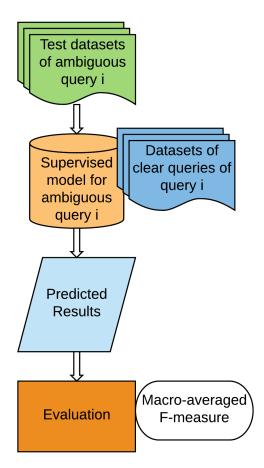


Figure 5.4: A diagram depicting the design model of the proposed approach.

5.2.2.1 Mechanism

The experiments here were performed in two stages in order to be compared with the traditional approach. In the first stage, the datasets of mixing-based human annotated benchmarks (i.e., manually annotated) were considered as training datasets, and the datasets of plain benchmarks were considered as test datasets. The second stage is similar; the only difference is that the training datasets were taken from BRF-based benchmarks instead.

As shown in Figure 5.4, a supervised model was built for every ambiguous query based on datasets of clear queries. Then, these models were tested and evaluated against test datasets that contain search results of those ambiguous queries, by clustering the unseen search results on the fly. As in the baseline approach, this approach was applied on Google and Bing, separately. Figure 5.5 abstracts the mechanism in pseudocode style.

- 1: **set** data processing variables
- 2: set vector-space related variables
- 3: set clustering-related variables
- 4: **let** *training_benchmarks* = [mixing_based_benchmark, brf_based_benchamrks]
- 5: **let** *test_benchmark* = ordinary_based_benchmark
- 6: **let** *selection_source_modes* = [TITLE_ONLY, TITLE_WITH_SNIPPET, SNIPPET_ONLY, INNER_PAGE]
- 7: **let** *space_representation_modes* = [SINGLE_WORDS, PHRASES_OF_2_GRAMS, SINGLE_WORDS_WITH_2_GRAMS, SINGLE_WORDS_WITH_2_AND_3_GRAMS]
- 8: foreach training_benchmark in training_benchmarks
- 9: foreach query in ordinary_based_benchmark do

10: *main_exp_procedure:*

- 11: **foreach** source_mode **in** selection_source_modes **do**
- 12: foreach representation_mode in space_representation_modes do
- 13: Get the labeled raw search results of clear queries of *query* from *training_benchmark*
- 14: Prepare the training raw search results given *source_mode* and *data processing variables*

Supervised

clustering

On-fly

clustering

model

- 15: Build the training vector space dataset given *representation_mode* and *vector-space related variables*
- 16: Build the supervised clusterer model using results of clear queries of *query* from *training_benchmark*
- 17: Get the labeled raw search results of *query* from *test_benchmark*
- Prepare the test raw search results given *source_mode* and *data processing variables*
- 19: Build the test vectore space dataset given *representation_mode* and *vector-space related variables*
- 20: Perform the clustering on-the-fly on search results of the ambiguous query *query* based on the previous built model in step 16
- 21: Evaluate and output evaluation metrics

Figure 5.5: A pseudocode describing the main steps of SAUL experiments.

5.2.3 Evaluation methodology

As the plain datasets (i.e., search results of ambiguous queries) might contain search results with no labels, the classes-to-clusters evaluation method⁴ (the last stage in Figure 5.4) in Weka [31] was modified as follows:

1. The resulting clusters can now be larger than or equal to the number of meanings (i.e., $K \ge C$, where K is the number of clusters, and C is the number of actual

⁴You can know more about classes-to-cluster method in the Background chapter (Chapter 2)

classes, which are the meanings of the ambiguous query). Previously, this was prohibited in Weka; K must be equal to C.

- 2. The missing labels must not affect the core logic of classes-to-clusters mechanism. This is because in such external validation, we care much more about how successful the machine learning algorithm is able to separate the labeled instances into the appropriate clusters.
- 3. The clusters, which have all their instances unlabeled, would be ignored. This means that these unlabeled instances will not be considered in the confusion matrix.
- 4. The clusters that have all their instanced labeled, would be taken into account, and their instances would be included in the confusion matrix.
- 5. The clusters that contains unlabeled instances, these unlabeled instances would be ignored in the confusion matrix.
- 6. Based on the above and after executing the core logic of classes-to-clusters mechanism, there could be clusters that are not assigned to classes (i.e., the case where the resulting clusters >= the actual classes). These clusters can have labeled instances. These labeled instances should not be excluded from the evaluation and should be taken into account. In fact, these labeled instances affect the true positive rate only (i.e., recall), thus the F-measure and accuracy. So, these instances will be counted when calculating the true positive rate. These instances, though, do not affect the precision. Figure 5.6 depicts an example of confusion matrix of ambiguous query with two meanings A and B as well as two resulting unknown clusters C' and C''. The \checkmark mark means that the value is taken into account, whereas the \varkappa mark means that the value will be neglected. This confusion matrix shows that the raws of C' and C'' are always neglected and their values will be 0 because the assumption is there are no actual instances from them. However, the columns of C' and C'' are taken into account because actual instances of A and/or B could fall into any of these two unknown clusters.

Predicted Actual	Α	В	C`	С.,
Α	2	0 🧭	1 🧭	0
В	0	1 🔗	0 🔗	1
C,	X	X	X	X
С.,	X	X	X	X

Figure 5.6: An example confusion matrix for an ambiguous query with two meanings.

After performing the evaluation method above, the popular evaluation metrics were calculated by first calculating the confusion matrix⁵. These metrics are the same metrics mentioned for the previous experiments (Section 5.1.6). The same significance test procedure is followed as well.

We took the best combination of the traditional approach and compared it with the best combination of the second approach. After performing the significance tests, the mean and median of the best combination of the baseline approach were compared with the mean and median of the best combination of the proposed approach. This was done for both search engines, Google and Bing. Given such data, the increase/decrease percentages were computed to see which is better (i.e., this proposed approach or the baseline approach).

⁵The confusion matrix contains true positive, false positive, true negative, and false negative values. The definitions of these terms can be found in the Background chapter (Chapter 2).

Chapter 6 Spread Framework

In this thesis, the **Spread** framework was developed. This framework aims at providing application programming interfaces (APIs) to run search results clustering experiments. As it is intended for research purposes, it is open to the public and ready to use. Spread framework was built to be extensible so that any interested developer can extend the framework to support different types of algorithms and data that can be used in SRC experiments. Its name is inspired by the idea of spreading search results over clusters and an acronym of Search REsults Disambiguation. In this section, we describe its main components and how it is built.

The goals of Spread framework can be summarized as follows:

- 1. Providing a facility to load the queries with their meanings and then fetching the search results for ambiguous and clear queries from different Web search engine like Google, Bing, and Yahoo.
- 2. Providing an interface for human relevance assessment for labeling search results.
- 3. Conducting SRC experiments with the ability of changing the variables described in Chapter 5.
- 4. Generating nice graphs to evaluate the clusters of search results..
- 5. Demonstrating the SAUL approach in action.

6.1 Implementation Technologies

This framework is built using various technologies and libraries. It is developed using *Java language*, along with *Java EE*, *Tomcat*, *Spring*, and *Hibernate*. Its code is version-controlled and managed on a public *GitHub* repository¹ with a companion site developed².

 $^{{}^{1} \}verb+https://git+ub.com/hay++am-salhi/Spread$

²https://haytham-salhi.github.io/Spread/

MySQL and *MongoDB* are used for storing Web search results. Particularly, MySQL is used to store all data described in the Data collection chapter. The complete MySQL scheme can be found in the Appendix A. On the other hand, MongoDB is used optionally to store the HTML content of fetched web pages. The reason behind this is that the HTML content of web pages is considered semi-structured and can be processed later to extract structured data.

For Java machine learning APIs, we integrated *Weka* [31] into Spread to use different machine learning algorithms.

The Web interfaces that are used for investigation throughout this thesis are deployed on our own public servers on *Amazon Cloud*.

6.2 Architectural Design

To achieve the goals of Spread framework, many components were implemented. Figure 6.1 present a high level overview of the main components.

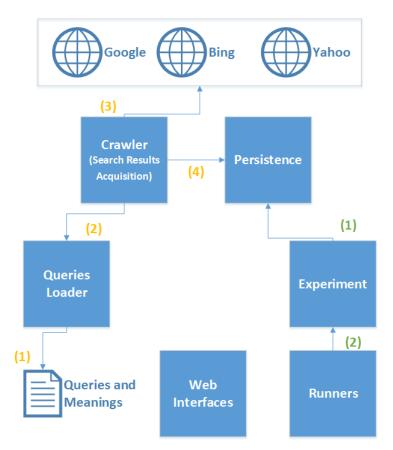


Figure 6.1: The big picture of the high-level components of Spread.

This section gives a brief overview of logical high level components, which are search

results acquisition (represented by left-side components (1), (2), (3), and (4) in Figure 6.1) and *experiment* (represented by right-side components (1) and (2)).

6.2.1 Web Search Results Acquisition Components

Following the flow numbered from 1 to 4 on the left side of Figure 6.1, the stage (1) indicates that the queries along with their meanings are collected in CSV files, like the ones we collected.

Basically, the file has 5 columns: query, meaning, description, class, formulation strategy. Figure 6.2 shows a snapshot of the file.

formulation startegy	class	description	meaning	query
APPEND	doctrine	أحد مذاهب السنة الأربع الكبرى، ويتبع مذهب الإمام مالك بن أنس	المذهب	المالكى
NO_APPEND	person	رئيس الوزراء العراقي الحالي	دوري المالكي	
NO_APPEND	person	لاعب گره قدم تونسی	مراد المالكي	
NO_APPEND	person	ممثل سعودي كوميدي	فابر المالكى	
APPEND	country	دولة عربية نقع في أسيا	سلطنة	عمان
APPEND	city	عاصمة الأردن	مدينة	
APPEND	country	دولة خايجية	دولة	الإمار ات
APPEND	company	شركة طير ان إمار انية مقر ها دبي	طيران	
APPEND	river	أعظم أنهار العالم ويقع في أمريكا الجنوبية	ىپر	أمازون
APPEND	forest	الاستوائية وتحتوي تتوع هاتل من الكانتات الحية	عابة	
APPEND	company	للمبيعات عبر الإنترنت مقرد في الولايات المتحدة	شركة	
	-ta		< 1 h	11

Figure 6.2: A snapshot of the structure of CSV queries file.

The query column represents the ambiguous query name (i.e., the query keywords). The meaning column represents the meanings of that ambiguous query. These meanings were collected with the help of Wikipedia. The next two columns represent a description for the clear query and a class for the clear query, respectively. The last column is a formulation strategy to specify either the clear query needs to be formulated by the ambiguous query plus the meaning, or the meaning only. This is determined by specifying either APPEND for the ambiguous query plus the meaning formulation or NO APPEND for the meaning only formulation.

After preparing these files, the queries loader in the stage (2) parses the CSV and passes the list of ambiguous queries to the crawler component. The crawler component in the stage (3) triggers the fetcher component for fetching from a specific search engine. Afterwards, in the stage (4) the fetcher component communicates with the persistence component to persist the search results for all queries loaded.

6.2.2 Conducting Experiments

The second important part of the framework is concerned with running search result clustering experiments. Figure 6.3 depicts the subcomponents of the high-level *experiment* component (stage (1)) on the right side of Figure 6.1. The *experiment* component has four main sub-components as follows:

• Data component: this component provides the required API for reading search

results datasets by communicating with the persistence component. It provides datasets of ambiguous query and datasets for clear queries.

- Search item preparation component: this component represents the core of data preprocessing and feature generation. This includes methods for:
 - Providing the required APIs to set the feature sources (i.e., title, snippet, title with snippet, or inner page) and feature space representations (e.g., single-words or phrases).
 - Arabic text preprocessor which includes the methods for: stemming, letter normalization, stop words removal, diacritics removal, non-Arabic words removal, non-alphabetic words removal, tokenization, punctuation marks removal, and so on.
 - Converting text data from string representation into vector-space representation. This process is referred to as vectorization.
 - Preparing multi-dimensional feature vectors so that they can be input to the clustering algorithm.
- *Clusterer*: this component is responsible for building the clustering model and provides the required APIs to set clustering algorithm variables such as the K variable, the initialization method, and the max number of iterations.
- *Evaluation*: this component is used after generating the clusters to evaluate the clustering model using the *classes to cluster* evaluation method.

In addition, the *runners* component (stage (2)) defines the experiments to run, generates some useful charts, and outputs the results into a structure of directories. This is achieved by orchestrating the APIs of the four subcomponents.

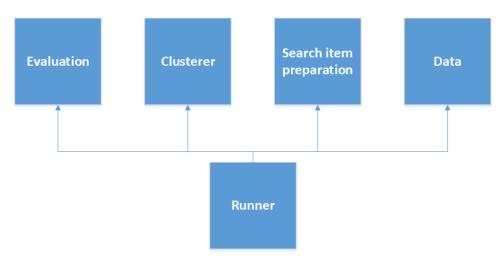


Figure 6.3: The subcomponents of *experiment*.

6.3 Experiment Pipeline

After discussing the architectural design of the framework, this section presents the big picture of experiment pipeline after integrating all experiment components. Figure 6.4 shows how the components communicate and are integrated together, combined with the set of variables, parameters, and outputs. Custom runners can be developed to run experiments with different configurations.

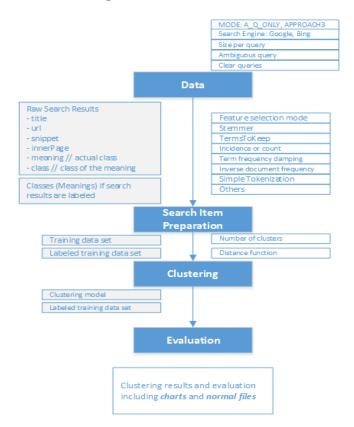


Figure 6.4: A high-level diagram of experiment pipeline.

6.4 Experiment Demonstration

Let's run an SRC experiment that uses K-means algorithm, with a dynamic determination of K using the framework;

1. First, you need to checkout the framework from the public Github repository: https://github.com/haytham-salhi/Spread.

The framework currently supports four runners:

(a) A runner that runs K-means on results of ambiguous queries with different K values.

- (b) A runner that runs K-means on results of ambiguous queries with a dynamic determination of K (based Calinski-Harabasz method [84]).
- (c) A runner that runs the proposed approach of this thesis (i.e., SAUL approach).
- (d) A runner that runs K-means of results that are made up of results of clear queries.
- 2. After importing the project into IDE like eclipse, you will have the following structure:

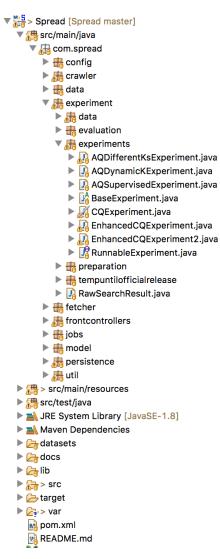


Figure 6.5: The structure of Spread framework.

3. Open a new driver class and start defining an object instance of the experiment,

as shown in Figure 6.6.

// The neutralized ones

```
// 1. Define the runner
BaseExperiment aQDynamicKExperiment = (BaseExperiment) applicationContext.getBean("AQDynamicKExperiment");
aQDynamicKExperiment.setExperimentName("experiment-dynamic-k-full_" + true + "-" + new Date().getTime() + "-" + customName);
aQDynamicKExperiment.setAlgorithmName("k-means"); // the sub folder name of the experiment
aQDynamicKExperiment.setBasePath("/var/www/html/experiments/"); // To be set just here in APIs
```

Figure 6.6: Object instance from the runner.

4. Then, you need to specify the values of the variables that will be changed during the execution of the experiment as shown in Figure 6.7 as well as the neutralized variables as shown in and Figure 6.8. Currently, this runner supports changing two variables: feature source mode and feature space mode.

Figure 6.7: The values of the experiment variables.

```
SearchEngineCode searchEngineCode = SearchEngineCode.GOOGLE;
boolean withInnerPage = true;
// Text preprocessing related
Stemmer stemmer = new LightStemmer();
boolean letterNormalization = true;
boolean diacriticsRemoval = true;
boolean puncutationRemoval = true;
boolean nonArabicWordsRemoval = true;
boolean arabicNumbersRemoval = true;
boolean nonAlphabeticWordsRemoval = true;
boolean stopWordsRemoval = true;
boolean ambiguousQueryRemoval = true;
// Vector-space related (dictionary related)
boolean countWords = true;
//int wordsToKeep = 40; // the top-N most common words;
//int wordsToKeepInCaseOfInnerPage = 300; // Only applied when detecting innerPage attribute added to training set
boolean TF = false; // damping
boolean IDF = true;
int nGramMinSize = 1; // 1 and 1 mean tokenize 1 gram (1 word), 2 and 2 mean tokenize 2-gram words
int nGramMaxSize = 1; // If you specify a range 1, 2. That means 1-gram and 2-gram will be included in the dictionary
int minTermFreqToKeep = 1;
```

Figure 6.8: The values of the neutralized variables.

5. Then, you need to set the experiment variables as shown in Figure 6.9.

```
((AQDynamicKExperiment)aQDynamicKExperiment).setVariables(sizes, featureSelectionModes, featureSpaceModes,
    searchEngineCode, withInnerPage, stemmer, letterNormalization, diacriticsRemoval,
    puncutationRemoval, nonArabicWordsRemoval, arabicNumbersRemoval, nonAlphabeticWordsRemoval,
    stopWordsRemoval, ambiguousQueryRemoval, countWords, wordsToKeep, wordsToKeepInCaseOfInnerPage,
    TF, IDF, minTermFreqToKeep);
```

Figure 6.9: The experiment variables set API.

6. Finally, you need to call the run API, which is the last statement in the code, as shown in Figure 6.10.



Figure 6.10: The experiment run API.

7. After you run the driver class using Java environment, the output will be in the path you specified as in Figure 6.6. It will look like the structure in Figure 6.11.



Figure 6.11: The structure of the output folder.

The output folder contains all detailed results including the evaluation metrics for all queries, the generated clusters, the detailed information about the model, and summary charts for evaluation. Figure 6.12 represents an example of the accuracy chart of Almalki (المالكي) query that shows the accuracy levels for different values of the experiment factors.

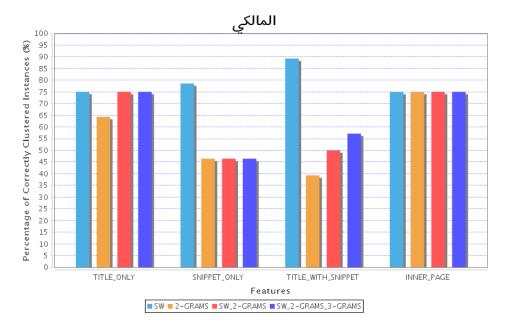


Figure 6.12: Summary of evaluation chart showing the accuracy.

Also, Figure 6.13 shows a snapshot of the evaluation text file. It shows the detailed evaluation along with the resulting clusters.

Clusters to classes mapping: 1. Cluster: Nouri Almalki (2) 2. Cluster: no class 3. Cluster: Doctrine (1)			
Classes to clusters mapping: 1. Class (Doctrine): 3. Cluster 2. Class (Nouri Almalki): 1. Clus 3. Class (Fayz Almalki): no clust			
Summaries:=== Summary ====			
Correctly Classified Instances	25		89.2857 %
Incorrectly Classified Instances	3		10.7143 %
Kappa statistic	0.7558		
Mean absolute error	0.0714		
Root mean squared error	0.2673		
Relative absolute error	22.9064	8	
Root relative squared error	69.1225	8	
Total Number of Instances	28		
Ignored Class Unknown Instances		72	
Weighted precession = 0.825892857142 Weighted recall = 0.892857142857142 Weighted Macro F measure = 0.851648 Averaged Macro F measure = 0.589743 Averaged Micro F measure = 0.892857 === Confusion Matrix ===	9 3516483516 5897435896		
a b c < classified as 5 0 0 a = Doctrine 0 20 0 b = Nouri Almalki 3 0 0 c = Fayz Almalki			

Figure 6.13: A snapshot of evaluation text file.

6.5 SAUL Approach in Action: A Demonstration

To show that the SAUL approach can be used in real search engines without human intervention (i.e., using blind relevance feedback), we built a component that fetches the senses from wikipedia disambiguation pages. These senses will then be digested by the SAUL mechanism. This section shows the big picture of the whole solution that can be used to disambiguate search results.

In particular, Spread has an API that disambiguates search results based on the SAUL approach along with wikipedia disambiguation pages as a discovery source for senses. This API is an HTTP GET API and has the following syntax:

GET http://{server_name}/spread?query={query}&engine={engine}

Parameter	Description
{server_name}	The server where Spread is running on.
{query}	The ambiguous query text you are looking for.
{engine}	The search engine. Possible values: \mathbf{G} (for Google) and \mathbf{B} (for Bing).

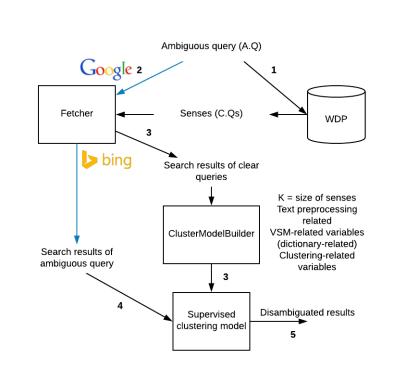


Figure 6.14: The big picture of the automated SAUL approach.

Table 6.1: The Spread API parameters.

Table 6.1 describes the required parameters in the Spread API. This API consults first the WDP component that is in charge of fetching the senses from wikipedia disambiguation pages. These senses will be entered as clear queries into the fetcher component. The fetcher component fetches the search results from the specified search engine. Here is where the SAUL approach comes. The search results of clear queries are taken into the ClusterModelBuilder to build the supervised clustering model. Finally, the search results of the ambiguous query will be input to the supervised clustering model. This model produces groups of results based on the senses. Figure 6.14 briefly depicts the whole flow of the automated SAUL approach.

As an example, let us disambiguate the search results of the query Amazon (أمازون) from Bing. So the request will look like:

GET spread?query=%D8%A3%D9%85%D8%A7%D8%B2%D9%88%D9%86&engine=B

After issuing the request, the SAUL mechanism will be executed. Figure 6.15 shows the disambiguated search results that are returned from Bing. Note that there is 1 search result in the group نهر أمازون, and the remaining 199 search results are in the group شركة أمازون.

```
}
] :نهر أمازون –
ر
              searchResultId: 25,
             title: "نهر الأمازون – ويكيبيديا، الموسوعة الحرة",
             url: "https://ar.wikipedia.org/wiki/ اهازون",
              ,".هو نهر يقع في أمريكا الجنوبية (Amazonas :الأَمَازُون أو الأُمَزُون (بالبرتغالية وبالإسبانية" ;
             innerPage: null,
             meaning: "NA",
clazz: "NA",
             ر مستعمر (مريد) المعرومة (Url: https://ar.wikipedia.org/wiki/ ويكيبيديا، الموسوعة الحرة : Title: امازون/informedBriefString: "Title: مو نهر يقع في أمريكا الجنوبية (Amazonas) مو نهر يقع في أمريكا الجنوبية (Amazonas)
        }
    1,
  ] :شركة أمازونً –
             searchResultId: 0,
              ,"وسيط امازون السعودية للشراء والتجميع من المواقع الامريكية" :
             url: "<u>https://wasetamazon.com/</u>",
snippet: "المعودية للشراء والتجميع من أمازون و المعواقع الامريكية",
             innerPage: null,
             meaning: "NA",
             clazz:
             formedBriefString: "Title: وسيط امازون الصعودية للشراء والتجميع من المواقع الامريكية Url: https://wasetamazon.
من أمازون و المواقع الامريكية "Meaning: NA Class: NA
         },
      - {
             searchResultId: 1,
             title: "امازون بالعربي للتسوق العربي العرب موقع امازون بالعربي",
             url: "https://www.hawaalive.com/brooonzyah/t139556.html",
             snippet: "ب. امازون بالعربي للتسوق العربي العرب موقع امازون بالعربي امازون بالعربي للتسوق العربي العرب"
             innerPage: null,
             meaning:
                        "NA",
             clazz: "NA",
             formedBriefString: "Title: اصازون بالعربي للتسوق العربي العرب صوقع اصازون بالعربي "Title: https://www.hawaalive،
ساترون بالعربي المازون بالعربي العربي العرب موقع اصازون بالعربي اصازون بالعربي للتسوق العربي العرب
      - {
              searchResultId: 2,
             title: "أمازون (شركة) - ويكيبيديا، الموسوعة الحرة",
             url: "https://ar.wikipedia.org/wiki/أمازون_(شركة/, ",
             snippet: "المحة تاريخية، تأسست شركة أمازون في عام 1994م وقد أسسها جيف بيزوس مدفوعا بما يسميه "إطار تقليل"
             innerPage: null,
```

Figure 6.15: Disambiguated search results of Amazon query from Bing.

Table 6.2 shows the classes to clusters mapping for the trained clustering model.

Consequently, the cluster C0 is labeled as شركة أمازون and the cluster C1 is labeled as أمازون.

Assigned to cluster ->	C0	C1
نهر أمازون	64	136
شركة أمازون	200	0

Table 6.2: The classes to clusters mapping of the trained clustering model.

Chapter 7 Evaluation and Statistics

The experimental design was improved and enhanced over a number of iterations of dry runs. Afterward, a wet-run of all experiments, as designed in the previous chapter, was performed to get the complete and final results.

This chapter presents the evaluation of experiments, the statistical analysis of results, and the main findings. It reports the evaluation metrics including precision, recall, and F-measure. The statistical analysis was conducted on the F-measure as an evaluation metric. The first section is concerned with the results of the influence of feature source and feature space representation on effectiveness of search results clustering. This section is divided into three subsections according to which benchmarks are used as follows: *mixing-based human-annotated benchmarks*, *BRF-based benchmarks*, and *plain benchmarks*. The second section of this chapter shows results with respect to the proposed approach (i.e., the SAUL approach) and compares them with results of the traditional approach. Finally, different statistics were used in result analysis and inference including: mean, median, boxplot analysis, normality test, Anova test (F-test), and PostHoc test.

7.1 Influence of Features

The goal here is to find whether there is a significant difference between feature sources (i.e., title, snippet, title with snippet, and inner page) and feature space representations (i.e., single words, phrases, single words with 2-grams, single words with 2-grams and 3-grams) on the effectiveness of search results clustering.

7.1.1 Mixing-based Human-annotated Benchmarks

As a quick reminder for this type of benchmarks, a collection of search results is formed for A.Q (i.e., an ambiguous query) where these results are composed of results belonging to its clear queries $C.Q_1, C.Q_2, \cdots$, evenly.

7.1.1.1 Google

For Google search engine, Figure 7.1 shows the boxplot of the weighted macro F-measure. Table 7.1 shows the mean value of F-measure for all conditions.

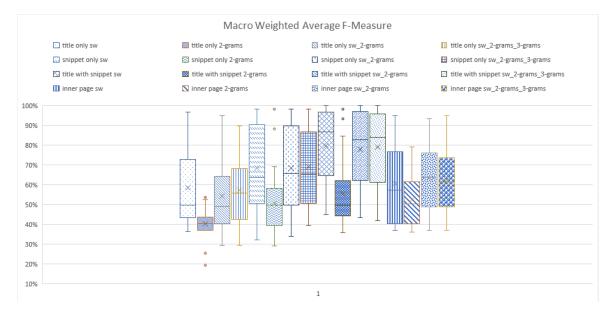


Figure 7.1: A boxplot diagram of F-measure when using MBHA benchmarks for Google.

Table C.6 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online¹. The details of raw results of both disambiguation and evaluation can be found online². Table 7.1 summarizes by showing the mean of each evaluation metric for all sources and spaces. In this and other tables displaying the evaluation metrics, each table has three values: P (precision), R (recall), and F (F-measure).

Table 7.1: The mean of each metric when using MBHA benchmarks for Google.	Table 7.1:	The mean of	of each	metric	when	using	MBHA	benchmark	s for	Google.
---	------------	-------------	---------	--------	------	-------	------	-----------	-------	---------

Source/		\mathbf{title}		S	nippe	t	title	w/sn	ippet	in	ner pa	ge
Space	Р	R	F	Р	R	F	Р	R	F	Р	R	F
sw	72%	65%	59%	77%	72%	69%	85%	82%	80%	79%	67%	61%
2-grams	73%	52%	40%	73%	59%	51%	73%	62%	55%	71%	59%	52%
sw_2-grams	74%	61%	45%	79%	72%	69%	84%	80%	78%	79%	68%	63%
sw_2-grams _3-grams	73%	63%	57%	79%	73%	69%	83%	81%	79%	79%	67%	62%

¹https://goo.gl/Q8hthB

²https://goo.gl/eHg4Gu

7.1.1.2 Bing

As for Bing search engine, Figure 7.2 shows the boxplot of the weighted F-measure. Table 7.2 shows the mean value of F-measure for all conditions.

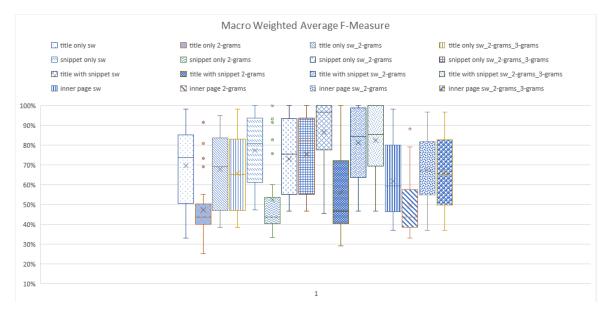


Figure 7.2: A boxplot diagram of F-measure when using MBHA benchmarks for Bing.

Table C.9 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online here³. The details of raw results of both disambiguation and evaluation can be found here⁴. Table 7.2 summarizes by showing the mean of each evaluation metric for all sources and spaces.

Source/		\mathbf{title}		S	nippe	t	title	w/sn	ippet	in	ner pa	ge
Space	Р	R	\mathbf{F}	Р	R	F	Р	R	F	Р	R	\mathbf{F}
sw	79%	73%	70%	84%	80%	77%	92%	88%	87%	77%	67%	62%
2-grams	72%	57%	47%	79%	61%	52%	78%	64%	56%	75%	58%	49%
sw_2-grams	80%	72%	68%	85%	76%	73%	89%	83%	81%	80%	71%	68%
sw_2-grams 3-grams	79%	70%	66%	85%	78%	76%	89%	84%	82%	79%	70%	66%

Table 7.2: The mean of each metric when using MBHA benchmarks for Bing.

³https://goo.gl/3p6tA5 ⁴https://goo.gl/HxzfwY

7.1.1.3 Mix of Google and Bing



Figure 7.3: A boxplot diagram F-measure when using MBHA benchmarks for mixed data.

Table C.12 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online⁵. The details of raw results of both disambiguation and evaluation can be found online⁶. Table 7.3 summarizes by showing the mean of each evaluation metric for all sources and spaces.

⁵https://goo.gl/HxzfwY

⁶https://goo.gl/bointz

Source/		title		S	nippe	t	title	w/sn	ippet	in	ner pa	ge
Space	Р	R	F	Р	R	F	Р	R	F	Р	R	F
sw	70%	60%	53%	79%	74%	71%	80%	76%	73%	69%	60%	53%
2-grams	68%	54%	44%	72%	58%	50%	70%	59%	52%	69%	57%	49%
sw_2-grams	70%	59%	53%	80%	73%	70%	76%	69%	65%	74%	63%	56%
sw_2-grams	72%	61%	55%	79%	72%	68%	76%	69%	64%	76%	65%	59%
_3-grams	1270	01/0	0070	1970	1270	0070	1070	0370	0470	1070	0070	0970

Table 7.3: The mean of each metric when using MBHA benchmarks for mixed data.

7.1.1.4 Discussion

The data of levels (i.e., conditions) are normally distributed. Based on the F-test (repeated measures ANOVA test) and adopting the macro weighted F-measure, the following items are concluded:

- There is a significant difference between the feature sources (i.e, **title**, **snippet**, **title-with-snippet**, and **inner page**) on clustering effectiveness (measured by F-measure). In other words, the effect of the feature sources on the effectiveness is significant.
- **Title-with snippet** is the best amongst the other sources. However, when mixing the Google and Bing results, **Snippet only** and then **Title-with snippet** are the best.
- There is a significant difference between the feature space representations (i.e, **sw**, **sw_2-grams**, **sw_2-grams**, and **sw_2-grams_3-grams**) on clustering effectiveness (measured by F-measure). In other words, the effect of the space representation on the effectiveness is significant.
- Single words dimensions, (single words with 2-grams and 3-grams), and (single words with 2-grams) dimensions are the best amongst the others.
- The **Source** * **Space** interaction effect on the quality of clusters (measured by F-measure) achieves a statistical significance.
- (Title with snippet * sw) is the best.

Therefore, the null hypothesis can be rejected, and the results above support the alternative hypothesis.

Notably, (title with snippet * sw), then (title with snippet * sw_2-grams_3-grams), and then (title with snippet * sw_2-grams) outperform the other combinations.

PostHoc tests support the claim that (title with snippet * sw) significantly differs from the other combinations.

In mix of both, we have small differences here as follows:

- (Snippet only * sw), (snippet only * sw_2-grams), and (snippet only * sw_2-grams_3-grams) outperform to some extent (title with snippet * sw_2-grams_3-grams) and (title with snippet * sw_2-grams).
- The reason for such difference is mainly due to the difference in lengths of title and/or snippet between Google and Bing. The wordsToKeep calculations in the Design chapter shows that Google tends to have longer title and snippet than Bing. Thus, mixing length-inconsistent titles and snippets and likely different strategies of generating snippets per engine are potential causes for such small difference.

Table 7.4 summarizes the discussion above by showing the best value for each condition and for each engine, along with ANOVA p value. In this and other tables summarizing the best values, the cell having more than one value means that these values are the best and listed in order.

Variable/ Engine	Source	Space	Source * Space				
Google	title w/ snippet, (1.51×10^{-10})	$ \begin{array}{c} \text{sw}_2_3, \ (1.33 \times 10^{-19}) \\ \text{sw} \\ \text{sw}_2 \end{array} $	title w/snippet * sw, (0.0463) title w/ snippet * sw_2_3 title w/ snippet * sw_2				
Bing	title w/ snippet, (1.11×10^{-06})	sw, (5.27×10^{-22}) sw_2 sw_2_3	title w/snippet * sw, (0.0138) title w/ snippet * sw_2_3 title w/ snippet * sw_2				
Mix of both	snippet, (7.78×10^{-07}) title w/ snippet	sw, (1.22×10^{-13}) sw_2_3 sw_2	title w/snippet * sw, (0.0005) snippet * sw snippet * sw_2				

Table 7.4: The best value for each variable along with the p statistics value.

7.1.1.5 Main Findings

By looking into the above results of the experiments, which were applied on the mixingbased human-annotated benchmarks, we have the following main findings:

- 1. The selection source of features is important and significantly affects the performance of search results disambiguation.
- 2. Building the dimensions of document vectors is important and significantly affects the disambiguation process.
- 3. Using (title with snippet * sw), (title with snippet * sw_2-grams_3grams), or (title with snippet * sw_2-grams) gives the best performance (in terms of effectiveness, measured by F-measure). Moreover, and most importantly, both engines, Google and Bing, align very well with this conclusion.

- 4. Mixing results from Google and Bing could lead to a bit unexpected results because each engine generates different lengths of titles and snippets, and perhaps different mechanism of generating snippets from original Web page. However, results show the same pattern and the same competing combination of (title with snippet * sw).
- 5. The results show increasing the data size improves the results for Google, Bing, and mix of Google and Bing, as shown in Figure 7.4. This figure shows how the effectiveness of disambiguation changes over different data sizes. The y-axis represents the macro F-measure. The x-axis represents the 16 levels of the two factors: feature sources and space representations (4×4) . Each curve indicates a particular data size. As concluded in the previous point that Google plus Bing are worse than the results for each separately, increasing the data size improves the results though. This indicates that the variations in snippet generation for each engine needs more data to learn the two engines in a combined model.



Figure 7.4: Macro weighted F-measure averaged across all queries over different data sizes.

7.1.2 Blind Relevance Feedback

As described in the Data Collection chapter, BRF-based benchmarks contain datasets that are pseudo-annotated. That is, assuming that the top 50% ranked documents are relevant to the sense of the query without manual check. The main goal is to see whether the pseudo relevance feedback supports the results in the previous experiments (i.e., human annotated).

7.1.2.1 Google

Figure 7.5 shows the boxplot of the weighted F-measure for Google search engine. Table 7.5 shows the mean value of F-measure for all conditions.



Figure 7.5: A boxplot diagram of F-measure when using BRF benchmarks for Google.

Table C.15 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online⁷. The details of raw results of both disambiguation and evaluation can be found online⁸. Table 7.5 summarizes by showing the mean of each evaluation metric for all sources and spaces.

⁷https://goo.gl/Ew8h27

⁸https://goo.gl/TYURgF

Source/		title		s	nippe	t	title	w/ sn	ippet	in	ner pa	ge
Space	Р	R	F	Р	R	F	Р	R	F	Р	R	F
sw	71%	61%	55%	73%	68%	64%	80%	75%	73%	74%	64%	57%
2-grams	71%	56%	47%	73%	58%	49%	73%	61%	55%	72%	59%	52%
sw_2-grams	71%	61%	55%	78%	73%	70%	81%	76%	74%	74%	68%	63%
sw_2-grams _3-grams	73%	62%	55%	77%	71%	68%	79%	74%	71%	74%	68%	63%

Table 7.5: The mean of each metric when using BRF benchmarks for Google.

7.1.2.2 Bing

As for Bing, Figure 7.6 shows the boxplot of the weighted F-measure. Table 7.6 shows the mean value of F-measure for all conditions.

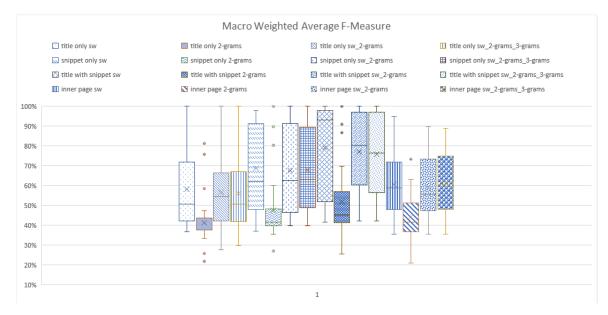


Figure 7.6: A boxplot diagram of F-measure when using BRF benchmarks for Bing.

Table C.18 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online⁹. The details of raw results of both disambiguation and evaluation can be found online¹⁰. Table 7.6 summarizes by showing the mean of each evaluation metric for all sources and spaces.

⁹https://goo.gl/gNh4JS

¹⁰https://goo.gl/ehXmPy

Source/		title		s	nippe	t	title	w/ sn	ippet	in	ner pa	ge
Space	Р	R	F	Р	R	F	Р	R	F	Р	R	\mathbf{F}
sw	74%	65%	58%	78%	73%	69%	85%	82%	79%	72%	65%	61%
2-grams	70%	53%	41%	73%	58%	47%	74%	61%	52%	69%	55%	44%
sw_2-grams	72%	63%	57%	78%	72%	68%	85%	80%	77%	72%	64%	59%
sw_2-grams _3-grams	73%	63%	56%	80%	73%	68%	84%	79%	76%	74%	66%	61%

Table 7.6: The mean of each metric when using BRF benchmarks for Bing.

7.1.2.3 Mix of Google and Bing

The BRF-based benchmarks also contains datasets that are composed of search results from both engines. Figure 7.7 shows the boxplot of the weighted F-measure. Table 7.6 shows the mean value of F-measure for all conditions.



Figure 7.7: A boxplot diagram of F-measure when using BRF benchmarks for mixed data.

Table C.21 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online¹¹. The details of raw results of both disambiguation and evaluation can be found online¹². Table 7.7 summarizes by showing the mean of each evaluation metric for all sources and spaces.

¹¹https://goo.gl/fq3PKk

¹²https://goo.gl/DqgW7E

Source/		title		s	nippe	t	title	w/ sn	ippet	in	ner pa	ge
Space	Р	R	\mathbf{F}	Р	R	F	Р	R	F	Р	R	\mathbf{F}
sw	75%	69%	64%	85%	80%	77%	90%	87%	85%	77%	70%	65%
2-grams	69%	55%	45%	75%	58%	49%	72%	60%	53%	72%	59%	52%
sw_2-grams	72%	65%	59%	81%	76%	72%	86%	81%	79%	78%	73%	70%
sw_2-grams	74%	65%	59%	82%	77%	74%	84%	79%	77%	79%	74%	71%
_3-grams	14/0	0370	5970	0270	1170	14/0	04/0	1970	11/0	1970	14/0	11/0

Table 7.7: The mean of each metric when using BRF benchmarks for mixed data.

7.1.2.4 Discussion

Based on the above weighted F-measure charts, the following items are concluded:

- In Google, the majority of good results (i.e., have more quality) occur at (title with snippet * sw_2-grams), (title with snippet * sw), and (title with snippet * sw_2-grams_3-grams).
- In Bing, the majority of good results occur at (title with snippet * sw), (title with snippet * sw_2-grams), and (title with snippet * sw_2-grams_3-grams).
- In mix of both, the majority of good results occur at (title with snippet * sw), (title with snippet * sw_2-grams), (snippet only * sw) and (title with snippet * sw_2-grams_3-grams).
- The pattern of effectiveness for all engines is very similar to the pattern of humanannotated mixing-based benchmarks.

Table 7.8 summarizes the discussion above by showing the best value for each condition and for each engine, along with ANOVA p value.

Variable/ Engine	Source	Space	Source * Space				
Google	title w/ snippet, (1.69×10^{-06})	$ \begin{array}{c} \text{sw}_2, \ (1.14 \times 10^{-13}) \\ \text{sw}_2_3 \\ \text{sw} \end{array} $	title w/ snippet * sw_2, (0.0222) title w/snippet * sw title w/ snippet * sw_2_3				
Bing	title w/ snippet, (1.36×10^-06)	$ \begin{array}{l} {\rm sw,} \ (3.30\times 10^{-21}) \\ {\rm sw}_2_3 \\ {\rm sw}_2 \end{array} $	title w/snippet * sw, (0.1623) title w/ snippet * sw_2 title w/ snippet * sw_2_3				
Mix of both	title w/ snippet, (6.17×10^{-07})	$ \begin{array}{l} {\rm sw,} \ (1.21\times 10^{-20}) \\ {\rm sw}_2 \\ {\rm sw}_2_3 \end{array} $	title w/snippet * sw, (0.0003) title w/ snippet * sw_2 title w/ snippet * sw_2_3				

Table 7.8: The best value for each variable along with the p statistics value.

7.1.2.5 Main Findings

By looking into the above results of the experiments, which were applied on the BRFbased benchmarks, we have the following main findings:

- 1. Interestingly, the box plot pattern of pseudo relevance feedback results is very close to the one of manually annotated results. Therefore, it supports the results and conclusions of the previous experiments (i.e., human annotated datasets).
- 2. Even though not every single result of the clear query is relevant to that query, pseudo relevance feedback succeeds and gives the same conclusions, and this is due to the assumption that the majority of results should be relevant to the clear query.
- 3. This considerably shows how useful pseudo relevance feedback concept can be in search results disambiguation. Particularly, this gives an initial hint that this new way of labeling by using blind relevance feedback can be relied on when labeling datasets (e.g., training datasets). Therefore, this eliminates the human efforts and saves time.

7.1.3 Plain Benchmarks

In this type of experiments, the disambiguation process was directly applied on search results of subset of ambiguous queries¹³, evaluated against human-annotated datasets with predefined meanings.

7.1.3.1 Google

Figure 7.8 shows the boxplot of the weighted f-measure for Google search engine. Table 7.9 shows the mean value of F-measure for all conditions.

¹³The subsets can be found in Appendix C.3.7 for Google and Appendix C.3.7 for Bing.

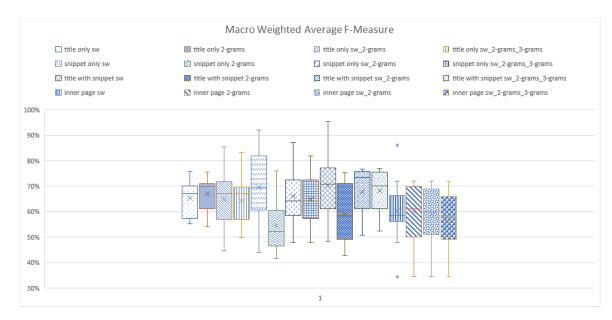


Figure 7.8: A boxplot diagram of F-measure when using plain benchmarks for Google.

Table C.24 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online¹⁴. The details of raw results of both disambiguation and evaluation can be found online¹⁵. Table 7.9 summarizes by showing the mean of each evaluation metric for all sources and spaces.

Table 7.9: The	e mean of eacl	n metric when	using plain	benchmarks	for Google.

Source/	title			snippet			title w/ snippet			inner page		
Space	Р	R	F	Р	R	F	Р	\mathbf{R}	F	Р	R	F
sw	76%	65%	65%	84%	66%	70%	79%	69%	70%	70%	64%	60%
2-grams	79%	66%	67%	71%	52%	55%	74%	57%	59%	62%	65%	60%
sw_2-grams	80%	61%	65%	82%	62%	66%	77%	66%	68%	63%	65%	59%
sw_2-grams	76%	61%	64%	86%	58%	65%	80%	66%	68%	60%	64%	56%
3-grams			0 1/0	0070	0070	0070	0070	0070	0070	0070	01/0	3370

7.1.3.2 Bing

As for Bing, Figure 7.9 shows the boxplot of the weighted f-measure. Table 7.10 shows the mean value of F-measure for all conditions

¹⁴https://goo.gl/c9fiWF

¹⁵https://goo.gl/T7eVNt



Figure 7.9: A boxplot diagram of F-measure when using plain benchmarks for Bing.

Table C.27 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online¹⁶. The details of raw results of both disambiguation and evaluation can be found online¹⁷. Table 7.10 summarizes by showing the mean of each evaluation metric for all sources and spaces.

Source/	title			snippet			title w/ snippet			inner page		
Space	Р	R	F	Р	\mathbf{R}	F	Р	\mathbf{R}	F	Р	R	\mathbf{F}
sw	88%	48%	58%	90%	51%	61%	94%	60%	70%	72%	69%	68%
2-grams	79%	54%	55%	77%	50%	51%	81%	47%	51%	63%	59%	54%
sw_2-grams	88%	52%	61%	88%	48%	58%	94%	59%	69%	73%	67%	66%
sw_2-grams	88%	53%	61%	87%	45%	55%	94%	57%	67%	73%	66%	66%
_3-grams	0070	0070	0170	0170	4070	0070	9470	5170	0170	1370	0070	0070

Table 7.10: The mean of each metric when using plain benchmarks for Bing.

7.1.3.3 Discussion

Based on the F-test (repeated measures ANOVA test) and adopting the weighted F-measure, the following items are concluded:

• In Google, the majority of good results (i.e., have more quality) occur at (title

¹⁶https://goo.gl/SGgTcY

¹⁷https://goo.gl/k3dM59

with snippet * sw), (snippet only * sw), (title with snippet * sw_2grams_3-grams), and (title with snippet * sw_2-grams).

- In Bing, the majority of good results occur at (title with snippet * sw), (title with snippet * sw_2-grams), (inner page * sw), and (title with snippet * sw_2-grams_3-grams).
- In Bing, **inner page** * **sw** shows up for the first time among the combinations that have good quality compared to others. This happened because the number of inner pages fetched for Bing is more than Google¹⁸.
- The **Source * Space** interaction effects on the quality of clusters (measured by F-measure) achieves a statistical significance.
- In Google, (Title with snippet * sw) is the best (with a weighted F-measure of 70% mean and 71% median).
- In Bing, (Title with snippet * sw) is the best (with a weighted F-measure of 70% mean and 72% median).

Therefore, the null hypothesis can be rejected, and the results above support the alternative hypothesis. Moreover, PostHoc tests show that (title with snippet * sw) significantly differs from the other combinations.

Table 7.11 summarizes the discussion above by showing the best value for each condition and for each engine, along with ANOVA p value.

Variable/ Engine	Source	Space	Source * Space
Google	title w/ snippet, (0.1106)	sw, (0.0088)	title w/ snippet * sw, (0.0454) snippet * sw title w/ snippet * sw_2_3
Bing	title w/ snippet, (0.0465)	sw, (1.24×10^{-07})	title w/ snippet * sw, (0.0243) title w/ snippet * sw_2 inner_page * sw title w/ snippet * sw_2_3

Table 7.11: The best value for each variable along with the p statistics value.

7.1.3.4 Main Findings

By looking into the above results of the experiments, which were applied on the plain benchmarks to see whether these benchmarks supports the claims concluded by mixingbased human-annotated benchmarks as well, we have the following main findings:

 $^{^{18}}$ For inner pages, not all sites allow you to crawl their web pages. However, we were capable of fetching inner page for most of search results. For Bing, we were able to crawl 2822 inner pages out of 3000 search results (labeled and unlabeled). For Google, we were able to crawl 1033 out of 1100 (labeled and unlabeled).

- 1. The results of experiments for Google and Bing still agree with the previous experiments on that the selection of source and how we build the dimensions considerably affect the performance of disambiguation.
- 2. Both engines agree on the best combination that gives the best performance: (title with snippet * sw), (title with snippet * sw_2-grams_3-grams), or (title with snippet * sw_2-grams), even though Google shows a competitive combination: (snippet only * sw); this makes total sense as snippets of Google tend to be longer than snippets of Bing.
- 3. Dynamically determining the number of clusters (i.e., the number of senses) based on a cluster validity criterion gives a reasonable performance. For the best combination, Google and Bing give 70% mean and 71% and 72% median, respectively. Now, are we getting better or worse results when we apply the proposed solution (i.e., SAUL)? This is discussed next.

7.2 The Proposed Approach: A Supervised Approach to Unsupervised Learning (SAUL)

This type of experiments augments supervised models into unsupervised learning by taking advantage of the models that are built using mixing-based human-annotated benchmarks or blind relevance feedback.

7.2.1 Models Built using Mixing-based Human-annotated Benchmarks

For each engine, a clustering model based on mixing-based human-annotated benchmarks is built. This model is then used to cluster new unseen search results of ambiguous queries.

7.2.1.1 Google

Figure 7.10 depicts the boxplot of the weighted F-measure for Google search engine. Table 7.12 shows the mean value of F-measure for all conditions.

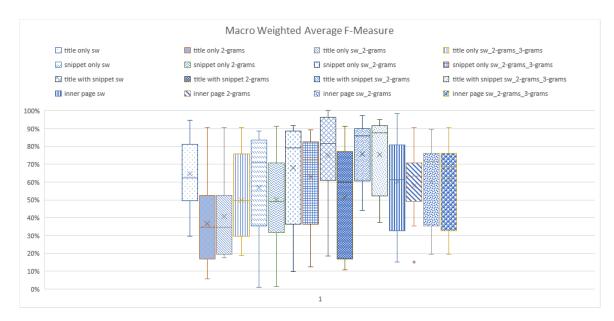


Figure 7.10: A boxplot diagram of F-measure when using MBHA supervised approach/Google.

Table C.30 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online¹⁹. The details of raw results of both disambiguation and evaluation can be found online²⁰. Table 7.12 summarizes by showing the mean of each evaluation metric for all sources and spaces.

Table 7.12: The mean of each metric when using MBHA supervised approach for	-
1 abie 1.12. The mean of each metric when using width Supervised approach for	Google.

Source/	title			snippet			title w/ snippet			inner page		
Space	Р	R	F	Р	R	F	Р	R	F	Р	R	F
sw	72%	68%	65%	67%	61%	57%	80%	76%	75%	67%	65%	60%
2-grams	38%	49%	37%	66%	59%	50%	61%	57%	51%	74%	62%	58%
sw_2-grams	60%	48%	41%	77%	72%	68%	84%	76%	76%	78%	64%	60%
sw_2-grams _3-grams	64%	55%	50%	74%	65%	63%	82%	77%	76%	73%	65%	61%

7.2.1.2 Bing

As for Bing search engine, Figure 7.11 depicts the boxplot of the weighted F-measure. Table 7.13 shows the mean value of F-measure for all conditions.

¹⁹https://goo.gl/pZhK6G

²⁰https://goo.gl/Rc7n34



Figure 7.11: A boxplot diagram of F-measure when using MBHA supervised approach/Bing.

Table C.33 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found $online^{21}$. The details of raw results of both disambiguation and evaluation can be found $online^{22}$. Table 7.13 summarizes by showing the mean of each evaluation metric for all sources and spaces.

Table 7.13: The mean of each metric when using MBHA supervised approach for Bing.

Source/	title			snippet			title w/ snippet			inner page		
Space	Р	R	\mathbf{F}	Р	\mathbf{R}	F	Р	R	F	Р	R	\mathbf{F}
sw	79%	70%	67%	77%	70%	66%	89%	83%	82%	64%	58%	52%
2-grams	65%	47%	36%	71%	56%	46%	68%	52%	43%	72%	50%	43%
sw_2-grams	83%	68%	65%	79%	68%	63%	87%	82%	80%	75%	65%	62%
sw_2-grams _3-grams	78%	66%	63%	80%	72%	68%	88%	82%	80%	73%	65%	61%

7.2.1.3 Discussion

Based on the weighted F-measure values for both Google and Bing, the following items are concluded:

²¹https://goo.gl/3rCtDR

²²https://goo.gl/YbQ1DN

- In Google, the majority of good results (i.e., have more quality) occur at (title with snippet * sw_2-grams), (snippet * sw_2-grams_3-grams), and (title with snippet * sw).
- In Bing, the majority of good results (i.e., have more quality) occur at (title with snippet * sw), (title with snippet * sw_2-grams), and (snippet * sw_2-grams_3-grams).
- The best combinations in Google and Bing are found to be the same. Table 7.14 shows the combinations along with the mean and median values of F-measure.

Table 7.14: The mean and median of F-measure for best combinations in Google and Bing.

Engine/	Go	oogle	Bing			
Combination	Mean	Median	Mean	Median		
title w/ snippet * sw	75%	81%	82%	84%		
title w/ snippet * sw_2	76%	86%	80%	77%		
title w/ snippet * sw_2_3	76%	88%	80%	77%		

7.2.2 Models Built using Mixing-based Blind Relevance Feedback

Instead of using mixing-based human-annotated approach of building the clustering models, these models are built using the datasets that are based on the concept of blind relevance feedback.

7.2.2.1 Google

Figure 7.12 depicts the boxplot of the weighted F-measure for Google search engine. Table 7.15 shows the mean value of F-measure for all conditions.



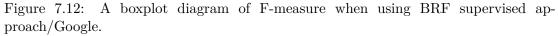


Table C.36 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online²³. The details of raw results of both disambiguation and evaluation can be found online²⁴. Table 7.15 summarizes by showing the mean of each evaluation metric for all sources and spaces.

²³https://goo.gl/66GFj8

²⁴https://goo.gl/xRvASu

Source/	title			$\mathbf{snippet}$			title w/ snippet			inner page		
Space	Р	R	F	Р	\mathbf{R}	F	Р	R	F	Р	R	F
sw	56%	50%	45%	60%	61%	56%	77%	74%	72%	70%	62%	58%
2-grams	52%	59%	49%	70%	64%	56%	64%	64%	59%	61%	63%	55%
sw_2-grams	69%	60%	56%	74%	72%	69%	78%	75%	72%	56%	52%	49%
sw_2-grams _3-grams	67%	63%	56%	73%	71%	69%	74%	70%	68%	56%	54%	50%

Table 7.15: The mean of each metric when using BRF supervised approach for Google.

7.2.2.2 Bing

As for Bing search engine, Figure 7.13 depicts the boxplot of the weighted F-measure. Table 7.16 shows the mean value of F-measure for all conditions.



Figure 7.13: A boxplot diagram of F-measure when using BRF supervised approach/Bing.

Table C.39 in Appendix C.3 shows the F-measure values for all ambiguous queries. They can also be found online²⁵. The details of raw results of both disambiguation and evaluation can be found online²⁶. Table 7.16 summarizes by showing the mean of each evaluation metric for all sources and spaces.

²⁵https://goo.gl/YZgcmf

²⁶https://goo.gl/SqYCHd

Source/	title			snippet			title w/ snippet			inner page		
Space	Р	R	F	Р	R	F	Р	R	F	Р	R	F
sw	77%	67%	63%	77%	66%	62%	86%	82%	80%	75%	69%	66%
2-grams	56%	47%	34%	64%	53%	42%	71%	58%	49%	64%	51%	39%
sw_2-grams	76%	64%	58%	75%	64%	59%	85%	76%	74%	74%	70%	66%
sw_2-grams	70%	64%	58%	80%	68%	64%	85%	77%	74%	74%	67%	65%
_3-grams	1070	0470	3870	8070	0870	0470	0570	1170	1470	1470	0170	0370

Table 7.16: The mean of each metric when using BRF supervised approach for Bing.

7.2.2.3 Discussion

Based on the weighted F-measure values for both Google and Bing, the following items are concluded:

- In both Google and Bing, the majority of good results (i.e., have more quality) occur at (title with snippet * sw), (title with snippet * sw_2-grams), and (title with snippet * sw_2-grams_3-grams).
- The pattern of effectiveness is very similar to the pattern of human-annotated mixing-based benchmarks.
- The best combination found for Google, (title with snippet * sw), achieves 72% mean and 75% median.
- The best combination found for Bing, (title with snippet * sw), achieves 80% mean and 89% median.

7.2.3 Main Findings

By looking into the results of the proposed approach experiments, we have the following main findings:

- 1. The results of experiments for Google and Bing still agree with the previous experiments on that the *selection of source* and *how we build the dimensions* considerably affect the performance of disambiguation.
- 2. Both engines agree on the best combination that gives the best performance: (title with snippet * sw), (title with snippet * sw_2-grams_3-grams), or (title with snippet * sw_2-grams).
- 3. Leveraging the models of clear queries for building supervised clustering models to disambiguate search results of ambiguous queries gives very good and interesting results in terms of effectiveness (measured by F-measure).

- 4. By comparing Google and Bing in the traditional approach with the proposed approach (i.e., SAUL approach) and by taking the best combination of source and space in each, the proposed approach (built on mixing-based human-annotated datasets) outperforms the traditional one by an *increase* of 8% and 18% in mean and 15% and 17% median, for both Google and Bing, respectively. Moreover, the proposed approach (built on blind relevance feedback datasets) outperforms the traditional one by an *increase* of 3% and 15% in mean and 6% and 24% in median, for both Google and Bing, respectively. Figure 7.14 visualizes these percentages and compares between the different approaches. Additionally, Table 7.17 summarizes the percentages for all approaches.
- 5. Most of previous experiments, with different approaches, agrees on building the clusterer for search results disambiguation using *title with snippet* as a features source and *sw* only or *sw_2-grams* or *sw_2-grams_3-grams* as a features representation gives the best effectiveness (measured by F-measure).
- 6. All above experiments show that using *phrases only* (i.e., 2-grams) as features *hurts* the clustering process in disambiguation regardless the source you take from. This is proven by the bad performance in terms of effectiveness (measured by F-measure) resulted by the 2-grams.
- 7. In all above experiments and with current settings, there are many reasons why innerpages show a bad performance compared to title with snippet. One reason is that web pages contain much noisy data (i.e., text not related to the topic). Moreover, another reason not directly related to the nature of web pages but to how web developers create them. Many websites hide some/all page contents behind JavaScript to protect it from crawling or stealing the content, which considerably affects the preprocessing stage; thus, the effectiveness of the disambiguator.

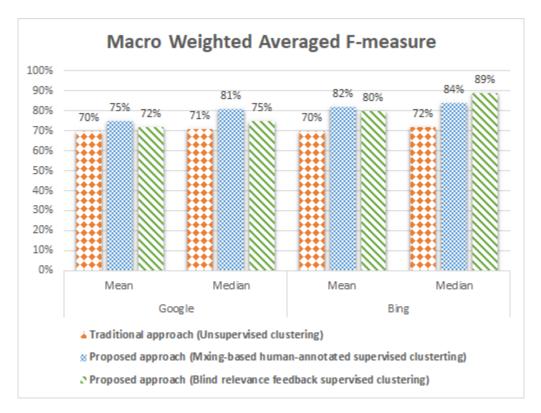


Figure 7.14: A comparison chart between the three approaches based on macro F-measure.

Table 7.17: The mean and median of macro F-measure for different approaches.

Engine/Approach	Tradition	nal Prop	osed (HA)	Proposed (BRF)		
	Mean $ $ Me	edian Mea	n Median	Mean	Median	
Google	70% 7	1% 75%	81%	72%	75%	
Bing	$\mid 70\% \mid 7$	2% 82%	84%	80%	89%	

7.2.4 Comparison Using A Query Example

While the previous sections depict the big picture of results, this subsection compares between the traditional approach (i.e., baseline) and the proposed approaches: MBHA supervised clustering and BRF supervised clustering by showing specific query example. It summarizes the clustering results for the Bing search results of عان query as an example. This query could refer to Oman (i.e., the country) or Amman (i.e., the city). Therefore, sultanate and capital are the meanings of that ambiguous query.

In the traditional approach, the resulting clusters (i.e., groups) are 6 clusters. The search results are distributed across the clusters as shown in Table 7.18. Each number in

this table and the following tables is the number of search results that actually belongs to the meaning.

Assigned to cluster ->	C0	C1	C2	C3	C4	C5	C6
Sultanate	12	0	20	1	4	2	4
Capital	7	10	0	1	2	0	1

Table 7.18: The clusters of search results of عمان query using the baseline approach.

In the MBHA supervised clustering approach, the resulting clusters are 2 clusters. The search results are distributed across the clusters as shown in Table 7.19. This shows that this approach is better than the baseline approach.

Table 7.19: The clusters of search results of عان query using the MBHA supervised approach.

Assigned to cluster ->	C0	C1
Sultanate	1	42
Capital	21	0

In the BRF supervised clustering approach, the resulting clusters are 2 clusters as well. The search results are distributed across the clusters as shown in Table 7.20. This shows that this approach is also better than the baseline approach.

Table 7.20: The clusters of search results of عمان query using the BRF supervised approach.

Assigned to cluster ->	C 0	C1
Sultanate	38	5
Capital	0	21

Chapter 8 Conclusion and Outlook

This chapter draws the conclusion of the whole thesis and shows some work that can be done in future.

8.1 Conclusion

Using search results clustering as an approach to solve search results disambiguation problem is a good choice because inducing clusters from search results gives improved insights about query senses or meanings. This is very useful in helping users identify their information need easily and faster. Nevertheless, dealing with search results clustering is very challenging because for example the resulting clusters should be of high quality (i.e., the degree to which search results in a cluster belong to same meaning) and the cluster labels must be understandable.

This thesis helps mitigate some research gaps in search results clustering with focus on Arabic language. First, there has been no publicly available benchmarks for Arabic language, this thesis introduces such benchmarks (called AMBIGArabic) that can be used in any experiments involving search results clustering or even more generally search results disambiguation. In addition to human labeling that is usually performed to build such benchmarks, this study proposes two new labeling approaches that can be used along with the manual labeling: *mixing-based labeling* and *intersecting-based labeling*. This kind of benchmarks is very helpful for researchers who want, for example, to study and compare different methods or algorithms for search results clustering.

Second, as there has been no clear proof that shows what source of features one should take from or how one can represent such features in vector space model, and though different studies propose different ways of text feature representation such as n-grams or lexical affinities, or single words along with ordered sequences, this thesis shows that deciding which *feature source* to select (i.e., title only, snippet only, title with snippet, or inner page) and/or which *vector space representation* to use (i.e., single words (sw), 2-grams, sw with 2-grams, and sw with 2-grams and 3-grams), *statistically significantly* matters. In other words, the findings show that working with single words alone or even single words along with n-grams (like 2-grams and/or 3-grams) is the best. Moreover, this thesis shows that extracting those features from title and snippet gives the best effectiveness in terms of F-measure. This thesis recommends adopting them (i.e., title with snippet as a feature source and single words or even single words along with 2-grams and/or 3-grams as a feature representation) for Arabic language in the preprocessing stage.

To conduct search result clustering experiments, there has been no frameworks that aid in implementing and running such experiments. This thesis offers a new kind of extensible framework, called Spread, that is primarily built upon Weka framework. In particular, this framework has the ability to perform SRC experiments and fetch search results from engines like Google, Bing, and Yahoo. In addition, this framework offers a human assessment interface, that can be used to label search results using different strategies like *yes/no annotation* or *multi-meanings choices*.

Third, this thesis proposes a new way for dealing with search results clustering. A popular traditional approach (which is considered as a baseline approach) of using SRC-based methods is to cluster the search results using K-means with a dynamic determination of K. However, despite the fact that they dynamically cluster search results, most of their methods have poor label indicators for clusters generated, and consequently generating such labels is not an easy task. Instead, the proposed idea is based primarily on augmenting a supervised approach leveraging training datasets of clear queries into clustering, which is an unsupervised learning. This process involves building a supervised clustering model for each ambiguous query, then this model is used to cluster/classify new unseen search results. Knowing that collecting clear queries and labeling them by experts is very time consuming, this thesis also shows how blind relevance feedback can be very useful when using it to build training datasets instead. When comparing this proposed approach (called SAUL) to the traditional clustering approach, the proposed approach outperforms the traditional approach by 8% and 18%, when using human labeled training datasets, and by 3% and 15%, when using blind relevance feedback datasets, for Google and Bing, respectively. Additionally, the cluster label generation problem becomes easy since each generated cluster will be labeled by the defined meaning, which is primarily used in the clear query formulation.

As a real use case, the proposed approach can be used as follows: a fully working disambiguation system can be built by forming clear queries of words/phrases by getting their meanings/senses from a lexical database or a Web taxonomy-such as ODP, Word-Net, and WDP, then fetching search results for the clear queries, and then building a supervised model per word/phrase based on those results and using the blind relevance feedback. Afterwards, when a word/phrase is queried, their search results will be input to its supervised clustering model and reported accordingly. To prove the feasibility of this use case, this thesis introduces a fully working API that is based on the SAUL approach along with WDP as a discovery source for the senses. This API is a main part of the Spread framework and is demonstrated in Chapter 6.

As usual, no work without limitations. The scope of the experimental research of this study covered two factors only: feature sources and feature space representations. Other important factors having high impact on effectiveness can be studied such as how many terms/features should be kept in vector space model. In addition, the new proposed approach for search results clustering is based on knowledge repositories or web taxonomies such as ODP, WordNET, and WDP to collect the ambiguous queries and their meanings/senses. This adds overhead to the process even though such models are often built offline. The new proposed approach also needs to fetch search results for all formed clear queries after collecting meanings/senses but this often happens offline as well. Additionally, clustering search results based on predefined senses from a knowledge repository makes the disambiguation of the search results coupled with those senses only, meaning that there might be search results of the ambiguous query that do not belong to any of the senses returned from the knowledge repository.

8.2 Outlook

Future work that can be developed include:

- 1. Studying other important factors like how many words to keep in vectorization process in search results clustering that could significantly improve quality of clustering.
- 2. Working on the idea of increasing the weight of neighbor terms that are positionally close to query terms and investigating whether this improves the clustering performance significantly.
- 3. Working on the idea of selecting the initial centroids of K-means algorithm (i.e., initial seeds) by having the top search result of each clear query, and then doing the traditional clustering. This might speed up the convergence of the K-means algorithm.
- 4. When combining results from both engines, it is worth to try to normalize term frequency by the length of snippet and see whether the results improve.
- 5. Implementing a scalable architecture of the proposed approach of search results clustering that can scale to thousands of ambiguous queries without affecting the efficiency.
- 6. Extending the Spread framework to support different kinds of popular clustering algorithms that can be used when benchmarking.
- 7. Working on the idea to build ensemble clusterer that consists of clusterer for title, clusterer for snippet, and clusterer for inner page, then the final decision will be based on weighted function that takes results for all those clusterers as input parameters.
- 8. Working on the idea of using *word2vec* which is a two-layer neural network that processes text instead and figuring out how this can be leveraged in search results clustering.

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Appendix A

Data Schema

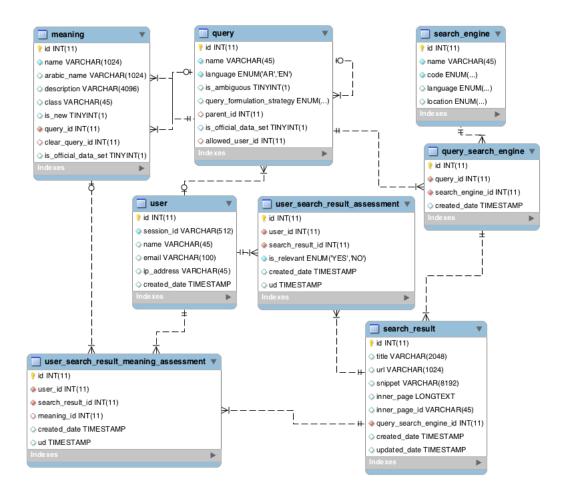


Figure A.1: A UML schema diagram for spread database.

Appendix B

Statistics about Words and Terms in Search Results

For the results of all official ambiguous and their clear queries. The following stats were measured:

Google

	Number of words	Number of results	Average number
Source	detected in	having words	of words per
	all search results	after preprocessing	search result
title	77020	9300 out of 9300	8.3
snippet	261652	9295 out of 9300	28.2
title w/ snippet	338672	9300 out of 9300	36.4
inner page	11040849	8730 out of 9300	1264.7

Table B.1: Statistics about words in the search results of Google.

Table B.2: Statistics about terms in the search results of Google.

	Number of terms	Number of results	Average number
Source	detected in	having terms	of terms per
	all search results	after preprocessing	search result
title	54076	9120 out of 9300	5.9
snippet	176775	9208 out of 9300	19.2
title w/ snippet	230851	9249 out of 9300	24.9
inner page	7231240	8474 out of 9300	853.3

BING

	Number of words	Number of results	Average number
Source	detected in	having words	of words per
	all search results	after preprocessing	search result
title	69480	9199 out of 9199	7.5
snippet	149547	9199 out of 9199	16.2
title w/ snippet	219027	9199 out of 9199	23.8
inner page	18629960	8482 out of 9199	2196.4

Table B.3: Statistics about words in the search results of Bing.

Table B.4: Statistics about terms in the search results of Bing.

	Number of terms	Number of results	Average number
Source	detected in	having terms	of terms per
	all search results	after preprocessing	search result
title	48353	9021 out of 9199	5.4
snippet	101594	9117 out of 9199	11.1
title w/ snippet	149947	9177 out of 9199	16.3
inner page	12762607	8386 out of 9199	1521.9

In this thesis, the intersections between the search results of Google and the search results of Bing and their Jaccard metric were calculated, you can browse them here for ambiguous queries¹ and clear queries 2 .

¹https://github.com/haytham-salhi/Spread/blob/master/stats.csv ²https://github.com/haytham-salhi/Spread/blob/master/stats-clear-queries.csv

Appendix C

List of Queries

Query	Number of meanings	Clear queries
امازون	2	نهر أمازون, شركة أمازون
عدنان إبراهيم	2	المخرج عدنان إبراهيم, المفكر عدنان إبراهيم
عمان	2	سلطنة عمان, مدينة عمان
جرار	2	جرار زراعي, بسام جرار
العشاء	2	صلاة العشاء, وجبة العشاء
نهاوند	2	مقام موسيقي نهاوند, مدينة فارسية نهاوند
القرش	2	عملة القرش, سمكة القرش
اسيا	2	قارة اسيا, اسية زوجةٍ فرعون
شعر	2	شعر الجسم, شعر أدب
عرفات	2	جبل عرفات, ياسر عرفات
كاميرون	2	جمهورية كاميرون, ديفيد كاميرون
المالكي	3	المذهب المالكي, نوري المالكي, فايز المالكي
البقرة	2	حيوان البقرة, سورة البقرة
صخر	3	شركة صخر, صخر بن عمرو أخو الخنساء, صخر حجري
الاقتران	2	الاقتران الزواج, الاقتران في الرياضيات
العزيز	2	العزيز اسماء الله الحسني, بوتيفار عزيز مصر
الاهرام	2	جريدة الاهرام المصرية, اهرام الجيزة
الجلمة	2	جلمة حماة, جلمة جنين
الملك عبد الله	2	عبد الله بن عبد العزيز آل سعود ملك السعودية. عبد الله الثاني بن الحسين ملك الأردن الحالي
الجامعة العربية	2	جامعة الدول العربية, الجامعة العربية المفتوحة
السكاكيني	2	جامع السكاكيني حلب, خليل ألسكاكيني
بورصة	2	مدينة بورصة التركية, بورصة سوق الاوراق المالية
العين	2	عين الحسد, عضو العين
الظاهرية	2	مذهب الظاهرية, ظاهرية ألخليل
طرابلس	2	طرابلس مدينة لبنان, طرابلس عاصمة ليبيا
الازهر	2	جامعة الازهر مصر, جامعة الازهر غزة
العربية	2	اللغة العربية, قناة العربية
الاسد	3	بشار الاسد, حيوان الاسد, برج الاسد
العذراء	2	مريم العذراء, برج العذراء
القدرة	2	القدرة الخليلية, القدرة فيزياء

Table C.1: List of all ambiguous queries and their clear queries.

C.1 Examples of How the Clear Query is Formulated

Ambiguous Query	Meaning	Formulated Query
المالكي		المالكي
*	المذهب	المذهب المالكَّى
	فايز المالكي	فايز المالكي
عمان	-	عمان
	سلطنة	سلطنة عمان
	مدينة	مدينة عمان
الإمارات		الإمارات
	دولة	دولة الإمارات
, c	طيران	طيران الإمارات
أمازون		أمازون
	نهر شرکة	نہر أمازون
	شركة	شركة أمازون
البقرة		البقرة
	حيوان	حيوان البقرة
	سورة	سورة البقرة
عدنان إبراهيم	.1.1	عدنان إبراهيم
	المخرج	المخرج عدنان إبراهيم
	المفكر	المفكر عدنان إبراهيم
اسيا		اسيا
	قارة	قارة اسيا
		اسية زوجة فرعون
	اسيا داغر	اسيا داغر
	مسلسل	مسلسل اسیا
عرفات		عرفات جبل عرفات
	جبل ياسر عرفات	ياسر عرفات
العشاء	يالمر حرقك	يتشر حريات
	صلاة	صلاة العشاء
	وجبة	وجبة العشاء
القدرة		وب. القدرة
	أكلة	أكلة القدرة
	فيزياء	فيزياء القدرة
القرش		القرش
	عملة	
	سكة	سمكة القرش

Table C.2: Examples of how the clear query is formulated.

C.2 Statistics about Human Judgments

Ambiguous query	Meaning	Number of search items assessed	Judge 1	Judge 2	Number of agreements	Number of agreed sense-relevan items
Amazon	River	100	Haytham	Yaser	87	85
	Company	100	Haytham	Yaser	97	87
Adnan Ibrahim	Director	100	Haytham	Yaser	92	30
	Thinker	100	Haytham	Yaser	100	100
Amman	Sultanate	100	Haytham	Yaser	96	96
	City	100	Haytham	Yaser	90	83
Jarrar	Jarrar zeraee	100	Haytham	Yaser	99	99
ourrai	Bassam jarrar	100	Haytham	Yaser	99	99
Alishaa'	Prayer	100	Haytham	Yaser	99	99
minimaa	Meal	100	Haytham	Yaser	98	97
Nahawnd	Music	100	Haytham	Yaser	86	82
Ivaliawiid	City	100	Haytham	Yaser	86	30
Qersh		100	Haytham	Sireen	90	84
Qersn	Currency	100		Sireen	90	93
	Fish		Haytham			
Asia	Continent	100	Haytham	Sireen	87	84
	Girl	100	Haytham	Sireen	97	95
Shir (Shi3r)	Hair	100	Haytham	Motasem	98	98
	Art	100	Haytham	Motasem	100	100
Arafat	Mountain	100	Haytham	Motasem	100	100
	Yaser arafat	100	Haytham	Motasem	98	77
Cameron	Country	100	Haytham	Omar	81	65
	David	100	Haytham	Omar	100	99
Maliki	Doctrine	100	Haytham	Emad	92	92
	Noore	100	Haytham	Emad	94	92
	Fayez	100	Haytham	-	99	99
Baqara	Animal	100	Haytham	Emad	74	57
Daqara	Soura	100	Haytham	Emad	98	98
Sakhr	Company	100	Haytham	Anas	88	38
Jakin					92	51
	Bn amro	100	Haytham	Anas		
T .	Rock	100	Haytham	-	81	81
Iqteran	Marriage	100	Haytham	Anas	98	75
	Function	100	Haytham	Anas	100	100
Aziz	Aziz	100	Haytham	Anas	90	89
	Botefar	100	Haytham	Anas	98	96
Ahram	Newspaper	100	Haytham	Yasmeen	85	41
	Ahram	100	Haytham	Yasmeen	87	84
Jalamah	Homah	100	Haytham	Hamzah	90	48
	Jeneen	100	Haytham	Hamzah	91	78
Malek Abdullah	Saudi	100	Haytham	Aziza	98	72
	Jordanain	100	Haytham	Aziza	95	90
Jamaa Arabiya	League	100	Haytham	Aziza	88	88
oamaa mabiya	University	100	Haytham	Aziza	96	96
Sakakini	Mosque	100	Haytham	Mohannad	99	78
Garakim	Khalil	100	Haytham	Mohannad	95	52
Dunan		100			98	97
Bursa	City	100	Haytham	Ahmad	98	97 97
A ·	Market		Haytham	Ahmad		
Ain	Envy	100	Haytham	Ahmad	94	94
	Eye	100	Haytham	Ahmad	93	33
Thaheryah	Doctrine	100	Haytham	Yazan	95	95
	Hebron	100	Haytham	Yazan	96	45
Tarablus	Lebanon city	100	Haytham	Mohannad	85	83
	Libyan City	100	Haytham	Mohannad	91	87
	E manut	100	Haytham	Yazan	95	95
Azhar	Egypt		77	Yazan	88	88
Azhar	Gazza	100	Haytham			
Azhar Arabiyah		100 100	Haytham Haytham	Omar	97	93
	Gazza				97 84	93 68
Arabiyah	Gazza Arabic Channel	100 100	Haytham Haytham	Omar Omar	84	
	Gazza Arabic Channel Bashar	100	Haytham Haytham Haytham	Omar Omar Yaser		68
Arabiyah	Gazza Arabic Channel Bashar Lion	100 100 100 100	Haytham Haytham Haytham Haytham	Omar Omar	84 98 100	68 98 100
Arabiyah Asad	Gazza Arabic Channel Bashar Lion Leo	100 100 100 100 100	Haytham Haytham Haytham Haytham Haytham	Omar Omar Yaser Yaser	84 98 100 100	68 98 100 100
Arabiyah	Gazza Arabic Channel Bashar Lion Leo Maryam	100 100 100 100 100 100	Haytham Haytham Haytham Haytham Haytham Haytham	Omar Omar Yaser Yaser - Yaser	84 98 100 100 89	68 98 100 100 85
Arabiyah Asad	Gazza Arabic Channel Bashar Lion Leo	100 100 100 100 100	Haytham Haytham Haytham Haytham Haytham	Omar Omar Yaser Yaser	84 98 100 100	68 98 100 100

Table C.3: Statistics about human judgments of Google mixing-based benchmark.

Ambiguous query	Sense	Number of search items assessed	Judge	Number of sense-relevant items
Amman		100	Haytham, Yaser	
	Neither			70
	Sultanate			19
	Capital			11
Jarrar		100	Haytham, Yaser	
	Neither			30
	Tractor			2
	Bassam Jarrar			68
Alishaa'		100	Haytham, Yaser	
	Neither			23
	Prayer			63
	Meal			14
Arafat		100	Haytham, Yaser	
	Neither			62
	Arafat Mountain			8
	Yaser Arafat			30
Maliki		100	Haytham, Yaser	
	Neither			75
	Doctrine			5
	Nouri Almalki			20
Sakhr		100	Haytham, Yaser	
	Neither			90
	Company			3
	Sakhr Bn Amro			7
Malek Abdullah		100	Haytham, Yaser	
	Neither			72
	King of Saudia			17
	King of Jordan			11
Jamaa Arabiya		100	Haytham, Yaser	
	Neither			47
	Arab League			26
	Arab Open University			27
Bursa		100	Haytham, Yaser	
	Neither		, , , , , , , , , , , , , , , , , , ,	43
	City			18
	Stock Exchange			39
Thaheryah		100	Haytham, Yaser	
	Neither			69
	Doctrine			8
	City			23
Tarablus	05	100	Haytham, Anas	
	Neither			67
	Lebanese City			11
	Capital of Libya			22
Arabiyah		100	Haytham, Yaser	
	Neither			79
	Arabic Language			9
	Alarabiya TV Channel			12
Athraa'		100	Haytham, Anas	12
	Neither	100		38
	Maryam			28
	Virgo			34
Qedra	v ii go	100	Haytham, Yaser	04
Genta	Neither	100	11aythain, 1aser	79
	i ineither	1	1	19
	Aklet Alqedra			7

Table C.4: Statistics about human judgments of Google plain benchmark.

	a	Number of		Number of
Ambiguous query	Sense	search items	Judge	sense-relevant items
A		assessed 200	TT	items
Amman	Neither	200	Haytham, Anas	136
	Sultanate			43
	Capital			21
Jarrar	Capital	200	Haytham, Anas	21
	Neither		;;	104
	Tractor			75
	Bassam Jarrar			21
Alishaa'		200	Haytham, Anas	
	Neither			62
	Prayer			82
	Meal			56
Arafat		200	Haytham, Anas	
	Neither			96
	Arafat Mountain			36
	Yaser Arafat			68
Maliki		200	Haytham, Anas	
	Neither			140
	Doctrine			36
	Nouri Almalki			24
Sakhr		200	Haytham, Anas	
	Neither			153
	Company			25
	Sakhr Bn Amro	200	TT I A	22
Malek Abdullah	NT 1.1	200	Haytham, Anas	111
	Neither			111
	King of Saudia			68
Iomoo Anobiro	King of Jordan	200	Hartham Anag	21
Jamaa Arabiya	Neither	200	Haytham, Anas	75
	Arab League			67
	Arab Open University			58
Bursa	Alab Open University	200	Haytham, Anas	
Duisa	Neither	200	may main, Anas	84
	City			61
	Stock Exchange			55
Thaheryah	Stock Excitatige	200	Haytham, Anas	
Thanoryan	Neither	200	Thay than, Thas	153
	Doctrine			19
	City			28
Tarablus		200	Haytham, Anas	
	Neither			123
	Lebanese City			26
	Capital of Libya			51
Arabiyah		200	Haytham, Anas	
	Neither			158
	Arabic Language			33
	Alarabiya TV Channel			9
Athraa'		200	Haytham, Anas	
	Neither			51
	Maryam			72
	Virgo			77
Qedra		200	Haytham, Anas	
	Neither			154
	Aklet Alqedra			17
	Physical Quantity			29

Table C.5: Statistics about human judgments of Bing plain benchmark.

C.3 Detailed Evaluation Results

In all tables of this appendix, shortcuts are used as follows: title as \mathbf{t} , snippet as \mathbf{s} , inner page as \mathbf{ip} , single words as \mathbf{sw} , 2-grams as $\mathbf{2-g}$, 3-grams as $\mathbf{3-g}$.

C.3.1 Google/Clear Queries

Table C.6: Per level and query macro F-measure when using MBHA benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	50%	40%	88%	88%	57%	44%	58%	58%
Adnan Ibrahim		40%	70%	70%	79%	69%	79%	97%
Amman	47%	40%	40%	68%	43%	36%	43%	43%
Jarrar	40%	37%	40%	40%	52%	67%	67%	67%
Alishaa'	39%	47%	39%	55%	95%	43%	43%	43%
Nahawnd	58%	40%	58%	58%	83%	58%	79%	79%
Qersh	69%	40%	50%	59%	63%	37%	47%	47%
Asia	95%	37%	63%	63%	90%	55%	77%	77%
Shir (Shi3r)	44%	37%	86%	86%	81%	50%	83%	83%
				38%	58%		52%	81%
Arafat	50%	37%	55%			63%		
Cameron	54%	54%	50%	50%	36%	50%	81%	79%
Maliki	91%	19%	29%	29%	51%	29%	60%	55%
Baqara	43%	43%	43%	43%	46%	39%	61%	61%
Sakhr	36%	37%	38%	52%	52%	31%	44%	46%
Iqteran	44%	47%	58%	55%	61%	44%	58%	63%
Aziz	83%	44%	75%	82%	98%	52%	98%	98%
Ahram	65%	44%	49%	49%	67%	47%	50%	50%
Jalamah	86%	47%	55%	67%	59%	51%	51%	51%
Malek Abdullal	1 78%	47%	95%	90%	97%	98%	95%	95%
Jamaa Arabiya		42%	42%	42%	65%	44%	95%	88%
Sakakini	65%	40%	69%	77%	93%	60%	93%	86%
Bursa	80%	37%	83%	58%	93%	88%	95%	93%
Ain	44%	37%	55%	58%	93%	40%	90%	90%
Thaheryah	71%	37%	44%	72%	46%	40% 52%	90% 65%	58%
Tarablus	48%	52%	48%	48%	95%	65%	93%	54%
Azhar	47%	37%	47%	56%	50%	39%	39%	39%
Arabiyah	97%	37%	47%	47%	50%	50%	50%	50%
Asad	46%	25%	30%	40%	32%	30%	34%	64%
Athraa'	63%	40%	40%	40%	86%	37%	90%	86%
Qedra	39%	44%	39%	39%	88%	50%	88%	88%
		/0	0070	0070	0070	0070	0070	0070
	tw/s	tw/s		tw/s	ip	ip	ip	ip
Dataset (Query)	tw/s sw	I		tw/s	ip		ip	ip
Dataset (Query) Amazon	,	tw/s	tw/s	tw/s	ip	ip 2-g	ip	ip
	sw	t w/ s 2-g	t w/ s sw_2-g	t w/ s	ip g sw	ip 2-g 42%	ip sw_2-g 40%	ip ; sw_2_3-;
Amazon Adnan Ibrahim	sw 95% 79%	t w/ s 2-g 47% 71%	t w/ s sw_2-g 90% 98%	t w/ s sw_2_3-g 90% 97%	ip g sw 40% 64%	ip 2-g 42% 60%	ip sw_2-g 40% 64%	ip sw_2_3 -1 40% 64%
Amazon Adnan Ibrahim Amman	sw 95% 79% 81%	t w/ s 2-g 47% 71% 47%	t w/ s sw_2-g 90% 98% 69%	t w/s sw_2_3-g 90% 97% 48%	ip g sw 40% 64% 37%	ip 2-g 42% 60%	ip sw_2-g 40% 64% 37%	ip sw_2_3- 40% 64% 37%
Amazon Adnan Ibrahim Amman Jarrar	sw 95% 79% 81% 97%	t w/ s 2-g 47% 71% 47% 40%	t w/s sw_2-g 90% 98% 69% 65%	t w/s sw_2_3-g 90% 97% 48% 65%	ip g sw 40% 64% 37% 40%	ip 2-g 42% 60% 60% 40%	ip sw_2-g 40% 64% 37% 40%	ip 5 sw_2_3-1 40% 64% 37% 44%
Amazon Adnan Ibrahim Amman Jarrar Alishaa'	sw 95% 79% 81% 97% 45%	t w/ s 2-g 47% 71% 47% 40% 40%	t w/s sw_2-g 90% 98% 69% 65% 43%	t w/s sw_2_3-g 90% 97% 48% 65% 43%	ip g sw 40% 64% 37% 40% 40%	ip 2-g 42% 60% 60% 40% 40%	ip sw_2-g 40% 64% 37% 40% 56%	ip sw_2_3- 40% 64% 37% 44% 73%
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	sw 95% 79% 81% 97% 45% 88%	t w/ s 2-g 47% 71% 47% 40% 40% 40% 66%	t w/ s sw_2-g 90% 98% 69% 65% 43% 63%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip g sw 40% 64% 37% 40% 40% 75%	ip 2-g 42% 60% 60% 40% 40% 40%	ip sw_2-g 40% 64% 37% 40% 56% 71%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	sw 95% 79% 81% 97% 45% 88% 92%	t w/ s 2-g 47% 71% 47% 40% 47% 66% 44%	t w/ s sw_2-g 90% 98% 69% 65% 43% 63% 97%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip 40% 64% 37% 40% 40% 40% 93%	ip 2-g 42% 60% 60% 40% 40% 40% 37%	ip sw_2-g 40% 64% 37% 40% 56% 71% 68%	ip 5 sw_2_3- 40% 64% 37% 44% 73% 73% 68%
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	sw 95% 79% 81% 97% 45% 88% 92% 100%	t w/ s 2-g 47% 71% 47% 40% 47% 66% 44% 60%	t w/ s sw_2-g 90% 98% 65% 43% 63% 97% 100%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip 40% 64% 37% 40% 40% 40% 93% 60%	ip 2-g 42% 60% 60% 40% 40% 40% 40% 61%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip 3 sw_2_3- 40% 64% 37% 44% 73% 68% 68% 60%
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	sw 95% 79% 81% 97% 45% 88% 92% 100% 86%	t w/ s 2-g 47% 71% 47% 40% 47% 66% 44% 60% 75%	t w/s sw_2-g 90% 98% 69% 65% 43% 63% 97% 100% 86%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip 5 sw 40% 64% 37% 40% 40% 60% 60% 40%	ip 2-g 42% 60% 40% 40% 40% 40% 61% 58%	$\begin{array}{c c} & \mathbf{ip} \\ & \mathbf{sw_2-g} \\ & 40\% \\ & 64\% \\ & 37\% \\ & 40\% \\ & 56\% \\ & 71\% \\ & 68\% \\ & 60\% \\ & 93\% \end{array}$	$\begin{array}{c c} & \mathbf{ip} \\ \mathbf{s} & \mathbf{sw}_2_3-, \\ \hline 40\% \\ 64\% \\ 37\% \\ 44\% \\ 73\% \\ 73\% \\ 68\% \\ 60\% \\ 93\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	sw 95% 79% 81% 97% 45% 88% 92% 100% 86% 98%	$\begin{array}{c} \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{2-g} \\ 47\% \\ 71\% \\ 47\% \\ 40\% \\ 44\% \\ 66\% \\ 44\% \\ 60\% \\ 75\% \\ 65\% \end{array}$	$\begin{array}{c c} \mathbf{t} \mathbf{w} / \mathbf{s} \\ \mathbf{sw} _ 2 \text{-} \mathbf{g} \\ 90\% \\ 98\% \\ 98\% \\ 69\% \\ 65\% \\ 43\% \\ 63\% \\ 97\% \\ 97\% \\ 100\% \\ 86\% \\ 95\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip 5 sw 40% 64% 37% 40% 40% 40% 66% 40% 88%	ip 2-g 42% 60% 40% 40% 40% 40% 61% 58% 79%	ip sw_2-g 40% 64% 37% 40% 56% 71% 68% 60% 93% 92%	ip ; sw_2_3-; 64% 37% 44% 73% 68% 60% 60% 93% 92%
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	sw 95% 79% 81% 97% 45% 88% 92% 100% 86% 98% 54%	t w/ s 2-g 47% 71% 47% 40% 47% 40% 44% 66% 60% 75% 65% 46%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip g sw 40% 64% 37% 64% 37% 93% 60% 60% 40% 88% 63% 63%	ip 2-g 42% 60% 40% 40% 40% 58% 79% 58%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip 5 sw_2_3- 40% 64% 37% 44% 73% 68% 68% 60% 93% 92% 65%
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	$\begin{array}{c} \mathbf{sw} \\ 95\% \\ 79\% \\ 81\% \\ 97\% \\ 45\% \\ 88\% \\ 92\% \\ 100\% \\ 86\% \\ 98\% \\ 54\% \\ 87\% \end{array}$	$\begin{array}{c} {\bf t} {\bf w}/{\bf s} \\ {\bf 2-g} \\ {47\%} \\ {71\%} \\ {47\%} \\ {40\%} \\ {47\%} \\ {66\%} \\ {44\%} \\ {60\%} \\ {75\%} \\ {65\%} \\ {46\%} \\ {36\%} \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip g sw 40% 64% 37% 64% 40% 75% 93% 60% 40% 88% 63% 58%	ip 2-g 42% 60% 40% 40% 40% 58% 58% 36%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} & \mathbf{ip} \\ \mathbf{s} & \mathbf{sw}_2_3-\\ & 40\% \\ & 64\% \\ & 37\% \\ & 44\% \\ & 73\% \\ & 73\% \\ & 68\% \\ & 60\% \\ & 93\% \\ & 92\% \\ & 65\% \\ & 78\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	sw 95% 79% 81% 97% 45% 92% 100% 86% 98% 54% 87% 97%	$\begin{array}{c c} \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{2-g} \\ 47\% \\ 47\% \\ 40\% \\ 47\% \\ 440\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 44\% \\ 66\% \\ 36\% \\ 43\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip 5 sw 40% 64% 40% 40% 40% 40% 40% 88% 63% 58% 50%	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{ip} \\ \mathbf{2-g} \\ 42\% \\ 60\% \\ 60\% \\ 40\% \\ 48\% \\ 37\% \\ 61\% \\ 58\% \\ 58\% \\ 79\% \\ 558\% \\ 58\% \\ 36\% \\ 44\% \\ 47\% \end{array}$	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{sw}_2 \cdot \mathbf{g} \\ 40\% \\ 64\% \\ 37\% \\ 40\% \\ 56\% \\ 71\% \\ 68\% \\ 60\% \\ 93\% \\ 92\% \\ 66\% \\ 93\% \\ 92\% \\ 65\% \\ 78\% \\ 50\% \end{array}$	$\begin{array}{c c} & \mathbf{ip} \\ \mathbf{s} & \mathbf{sw}_2_3-\\ & 40\% \\ & 64\% \\ & 37\% \\ & 44\% \\ & 73\% \\ & 73\% \\ & 68\% \\ & 60\% \\ & 93\% \\ & 92\% \\ & 92\% \\ & 65\% \\ & 50\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	sw 95% 79% 81% 97% 45% 88% 92% 100% 86% 98% 54% 87% 97% 49%	t w/ s 2-g 47% 71% 47% 40% 47% 66% 44% 66% 60% 75% 65% 46% 36% 38%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip g sw 40% 64% 37% 40% 40% 58% 60% 88% 63% 58% 50% 38%	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{2-g} \\ \mathbf{2-g} \\ \mathbf{2-g} \\ \mathbf{42\%} \\ \mathbf{60\%} \\ \mathbf{40\%} \\ \mathbf{40\%} \\ \mathbf{48\%} \\ \mathbf{37\%} \\ \mathbf{58\%} \\ \mathbf{57\%} \\ \mathbf{58\%} \\ \mathbf{55\%} \\ 55$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} & ip \\ & sw_2_3- \\ & 64\% \\ & 64\% \\ & 37\% \\ & 44\% \\ & 73\% \\ & 73\% \\ & 68\% \\ & 60\% \\ & 60\% \\ & 93\% \\ & 92\% \\ & 65\% \\ & 50\% \\ & 56\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{100\%} \\ \mathbf{86\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \end{array}$	t w/ s 2-g 47% 71% 47% 40% 47% 40% 44% 66% 65% 65% 65% 65% 63% 44%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip g sw 40% 64% 37% 40% 40% 75% 93% 60% 40% 88% 63% 50% 38% 44%	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{2-g} \\ \mathbf{2-g} \\ \mathbf{2-g} \\ \mathbf{42\%} \\ \mathbf{60\%} \\ \mathbf{60\%} \\ \mathbf{40\%} \\ \mathbf{40\%} \\ \mathbf{40\%} \\ \mathbf{40\%} \\ \mathbf{48\%} \\ \mathbf{53\%} \\ \mathbf{58\%} \\ \mathbf{79\%} \\ \mathbf{58\%} \\ \mathbf{58\%} \\ \mathbf{58\%} \\ \mathbf{58\%} \\ \mathbf{53\%} \\ \mathbf{53\%} \\ \mathbf{37\%} \\ \mathbf{53\%} \\ 53$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} & \mathbf{ip} \\ \mathbf{s} & \mathbf{sw}_2_3- \\ & 40\% \\ & 64\% \\ & 37\% \\ & 44\% \\ & 73\% \\ & 73\% \\ & 68\% \\ & 60\% \\ & 93\% \\ & 92\% \\ & 65\% \\ & 78\% \\ & 56\% \\ & 58\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz	sw 95% 79% 81% 97% 45% 88% 92% 100% 86% 98% 54% 87% 97% 49%	t w/ s 2-g 47% 71% 47% 40% 47% 66% 44% 66% 44% 66% 46% 43% 38% 43% 38% 43% 56%	$\begin{array}{c c} \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} 2^2 \mathbf{g} \\ 90\% \\ 98\% \\ 69\% \\ 65\% \\ 65\% \\ 63\% \\ 97\% \\ 100\% \\ 86\% \\ 95\% \\ 54\% \\ 52\% \\ 83\% \\ 68\% \\ 55\% \\ 100\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip g sw 40% 64% 37% 40% 40% 58% 60% 88% 63% 58% 50% 38%	ip 2-g 42% 60% 40% 40% 40% 40% 58% 36% 47% 58% 36% 47% 58% 36% 47% 53% 37% 45%	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{sw}_2 \cdot \mathbf{g} \\ 40\% \\ 64\% \\ 37\% \\ 40\% \\ 56\% \\ 71\% \\ 66\% \\ 60\% \\ 93\% \\ 92\% \\ 65\% \\ 50\% \\ 57\% \\ 93\% \\ 93\% \\ 65\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{100\%} \\ \mathbf{86\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \end{array}$	t w/ s 2-g 47% 71% 47% 40% 47% 40% 44% 66% 65% 65% 65% 65% 63% 44%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip g sw 40% 64% 37% 40% 40% 75% 93% 60% 40% 88% 63% 50% 38% 44%	ip 2-g 42% 60% 40% 40% 40% 40% 58% 36% 58% 36% 47% 58% 36% 47% 53% 37% 45%	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{sw}_2 \cdot \mathbf{g} \\ 40\% \\ 64\% \\ 37\% \\ 40\% \\ 56\% \\ 71\% \\ 66\% \\ 60\% \\ 93\% \\ 92\% \\ 65\% \\ 50\% \\ 57\% \\ 93\% \\ 93\% \\ 65\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz	$\begin{array}{c} \mathbf{sw} \\ 95\% \\ 95\% \\ 79\% \\ 81\% \\ 97\% \\ 45\% \\ 88\% \\ 92\% \\ 100\% \\ 86\% \\ 98\% \\ 54\% \\ 87\% \\ 97\% \\ 97\% \\ 49\% \\ 65\% \\ 100\% \end{array}$	t w/ s 2-g 47% 71% 47% 40% 47% 66% 44% 66% 44% 66% 46% 43% 38% 43% 38% 43% 56%	$\begin{array}{c c} \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} 2^2 \mathbf{g} \\ 90\% \\ 98\% \\ 69\% \\ 65\% \\ 65\% \\ 63\% \\ 97\% \\ 100\% \\ 86\% \\ 95\% \\ 54\% \\ 52\% \\ 83\% \\ 68\% \\ 55\% \\ 100\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip ig sw 40% 64% 37% 40% 40% 40% 60% 80% 60% 80% 58% 50% 38% 55%	ip 2-g 42% 60% 40% 40% 40% 40% 58% 58% 58% 53% 47% 53% 47% 44% 44% 44% 44% 44% 44% 44% 44%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{60\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \end{array}$	t w/ s 2-g 47% 47% 40% 47% 40% 47% 66% 44% 60% 75% 65% 46% 36% 43% 38% 44% 56% 47% 51% 98% 85%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip ig sw 40% 64% 37% 40% 75% 93% 60% 40% 58% 50% 38% 58% 81% 85% 68% 71%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{100\%} \\ \mathbf{66\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{100\%} \\ \mathbf{60\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \end{array}$	t w/ s 2-g 47% 71% 40% 47% 40% 466% 44% 66% 44% 65% 46% 38% 44% 56% 43% 43% 38% 44% 56% 51% 98% 85%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ipp 5 Sw 40% 64% 40% 40% 40% 40% 40% 40% 53% 58% 58% 58% 55% 38% 44% 55% 88% 44% 55% 88% 44% 50% 50% 50% 50% 50% 50% 50% 50% 50% 50	ip 2-g 60% 60% 40% 40% 53% 58% 58% 53% 47% 43% 47% 66% 40% 53% 66% 66% 66% 66% 66% 66% 66% 67% 63% 677%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakkini Bursa	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ 95\% \\ 79\% \\ 81\% \\ 97\% \\ 45\% \\ 88\% \\ 92\% \\ 100\% \\ 86\% \\ 86\% \\ 86\% \\ 86\% \\ 86\% \\ 87\% \\ 97\% \\ 49\% \\ 65\% \\ 100\% \\ 92\% \\ 92\% \\ 92\% \\ 92\% \\ 83\% \end{array}$	t w/ s 2-g 47% 71% 47% 40% 47% 66% 66% 66% 46% 36% 44% 56% 46% 38% 44% 56% 98% 85%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ipp j S Sw 40% 64% 64% 40% 40% 40% 40% 40% 40% 40% 58% 63% 55% 55% 68% 71% 81% 85% 66% 55% 66% 55% 66% 75% 64% 75% 75% 75% 75% 75% 75% 75% 75	ip 2-g 6 6.00% 6.00% 40% 40% 40% 5.8% 5.8% 36% 47% 5.33% 45% 40% 45% 67% 67% 67%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{100\%} \\ \mathbf{86\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{100\%} \\ \mathbf{60\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{83\%} \\ \mathbf{60\%} \end{array}$	t w/ s 2-g 47% 71% 47% 40% 47% 66% 44% 66% 44% 66% 46% 46% 43% 38% 44% 43% 38% 56% 47% 51% 85% 98% 85% 93% 55%	$\begin{array}{c c} \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2 \cdot \mathbf{g} \\ 90\% \\ 98\% \\ 69\% \\ 65\% \\ 65\% \\ 63\% \\ 97\% \\ 100\% \\ 86\% \\ 95\% \\ 54\% \\ 52\% \\ 83\% \\ 68\% \\ 55\% \\ 100\% \\ 60\% \\ 83\% \\ 83\% \\ 68\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 95\% \\ 61\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip ig sw 40% 64% 37% 40% 37% 40% 40% 66% 40% 60% 40% 50% 38% 55% 81% 85% 68% 71% 92% 56% 46%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{100\%} \\ \mathbf{60\%} \\ \mathbf{92\%} \\ \mathbf{60\%} \\ \mathbf{100\%} \\ \mathbf{60\%} \end{array}$	t w/ s 2-g 47% 47% 40% 47% 466% 665% 46% 65% 46% 65% 46% 56% 46% 56% 51% 98% 51% 93% 55% 50% 50%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ipp 5 sw 40% 64% 37% 40% 40% 75% 93% 60% 40% 88% 60% 50% 55% 55% 68% 71% 92% 56% 68% 71% 92%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{83\%} \\ \mathbf{60\%} \\ \mathbf{100\%} \\ \mathbf{65\%} \end{array}$	t w/ s 2-g 47% 71% 40% 47% 40% 47% 66% 44% 66% 44% 65% 46% 43% 43% 46% 38% 44% 56% 43% 51% 98% 85% 58%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ipp j sw 40% 64% 40% 40% 40% 40% 40% 40% 50% 50% 50% 55% 88% 63% 55% 64% 55% 64% 55% 64% 64% 64% 64% 64% 64% 64% 64	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ 95\% \\ 79\% \\ 81\% \\ 97\% \\ 45\% \\ 88\% \\ 92\% \\ 100\% \\ 86\% \\ 98\% \\ 54\% \\ 87\% \\ 98\% \\ 98\% \\ 98\% \\ 65\% \\ 100\% \\ 60\% \\ 92\% \\ 92\% \\ 98\% \\ 92\% \\ 92\% \\ 83\% \\ 60\% \\ 100\% \\ 65\% \\ 46\% \end{array}$	t w/ s 2-g 47% 71% 47% 40% 47% 466% 44% 66% 44% 66% 46% 46% 46% 43% 43% 43% 43% 48% 43% 56% 43% 56% 50% 38% 50% 39% 58% 50% 39%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip ig 5 64% 37% 64% 37% 40% 40% 40% 40% 93% 60% 40% 88% 63% 55% 38% 55% 85% 68% 71% 92% 56% 46% 37% 40% 56% 46% 37% 40% 54%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{60\%} \\ \mathbf{92\%} \\ \mathbf{65\%} \\ \mathbf{60\%} \\ \mathbf{100\%} \\ \mathbf{65\%} \\ \mathbf{46\%} \\ \mathbf{67\%} \\ \mathbf{67\%} \end{array}$	t w/ s 2-g 47% 71% 47% 40% 47% 40% 47% 66% 44% 60% 44% 60% 44% 60% 44% 60% 44% 58% 65% 46% 43% 38% 44% 56% 47% 51% 98% 58% 93% 58% 58% 50% 39% 58% 50% 50%	$\begin{array}{c c} \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} 2^2 \mathbf{g} \\ 90\% \\ 69\% \\ 65\% \\ 43\% \\ 63\% \\ 97\% \\ 100\% \\ 86\% \\ 95\% \\ 52\% \\ 52\% \\ 83\% \\ 68\% \\ 95\% \\ 55\% \\ 100\% \\ 88\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 85\% \\ 61\% \\ 100\% \\ 82\% \\ 69\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ipp j S Sw 40% 64% 37% 40% 40% 40% 58% 68% 55% 81% 85% 68% 71% 92% 55% 81% 55% 81% 68% 44% 55% 64% 40% 55% 64% 40% 40% 54% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 64% 55% 55% 55% 55% 55% 55% 55% 5	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{85\%} \\ \mathbf{97\%} \\ \mathbf{85\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{97\%} \\ \mathbf{65\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{92\%} \\ \mathbf{65\%} \\ \mathbf{66\%} \\ \mathbf{67\%} \\ \mathbf{65\%} \\ \mathbf{65\%} \end{array}$	t w/ s 2-g 47% 71% 71% 40% 47% 40% 47% 66% 44% 60% 75% 46% 36% 44% 56% 46% 38% 44% 56% 93% 50% 50% 50% 50% 50% 50% 50% 50% 50% 50	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip ig ig ig sw 40% 64% 37% 40% 40% 40% 40% 40% 53% 93% 66% 50% 38% 44% 50% 38% 44% 55% 66% 71% 92% 56% 46% 37% 40% 54% 47% 74%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{97\%} \\ \mathbf{45\%} \\ \mathbf{88\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{87\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{60\%} \\ \mathbf{92\%} \\ \mathbf{65\%} \\ \mathbf{60\%} \\ \mathbf{60\%} \\ \mathbf{67\%} \\ \mathbf{65\%} \\ \mathbf{65\%} \\ \mathbf{63\%} \\ \mathbf{63\%} \\ \mathbf{63\%} \\ \end{array}$	t w/ s 2-g 47% 71% 40% 47% 40% 47% 40% 47% 66% 44% 60% 44% 60% 44% 56% 46% 43% 56% 46% 56% 46% 56% 61% 50% 39% 58% 61% 50% 48% 61%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip ip ig sw 40% 64% 37% 40% 40% 40% 40% 40% 40% 40% 40% 40% 40% 40% 50% 50% 55% 81% 68% 71% 92% 56% 46% 37% 40% 54% 47% 55%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} & ip \\ & ip \\ & 3m_2 3-j \\ & 64\% \\ & 64\% \\ & 37\% \\ & 64\% \\ & 73\% \\ & 66\% \\ & 73\% \\ & 66\% \\ & 93\% \\ & 92\% \\ & 65\% \\ & 92\% \\ & 50\% \\ & 56\% \\ & 37\% \\ & 65\% \\ & 97\% \\ & 65\% \\ & 95\% \\ & 75\% \\ & 92\% \\ & 55\% \\ & 63\% \\ & 40\% \\ & 40\% \\ & 40\% \\ & 54\% \\ & 60\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c} \mathbf{sw} \\ \mathbf{95\%} \\ \mathbf{95\%} \\ \mathbf{79\%} \\ \mathbf{81\%} \\ \mathbf{97\%} \\ \mathbf{85\%} \\ \mathbf{97\%} \\ \mathbf{85\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{92\%} \\ \mathbf{98\%} \\ \mathbf{54\%} \\ \mathbf{97\%} \\ \mathbf{65\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{49\%} \\ \mathbf{65\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{92\%} \\ \mathbf{65\%} \\ \mathbf{66\%} \\ \mathbf{67\%} \\ \mathbf{65\%} \\ \mathbf{65\%} \end{array}$	t w/ s 2-g 47% 71% 71% 40% 47% 40% 47% 66% 44% 60% 75% 46% 36% 44% 56% 46% 38% 44% 56% 93% 50% 50% 50% 50% 50% 50% 50% 50% 50% 50	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip ig ig ig sw 40% 64% 37% 40% 40% 40% 40% 40% 40% 53% 93% 66% 50% 38% 44% 55% 68% 68% 66% 71% 92% 56% 46% 37% 40% 54% 47% 74%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Table C.7: Per level and query weighted recall when using MBHA benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query		2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	58%	53%	88%	88%	58%	55%	62%	62%
Adnan Ibrahim	50%	53%	72%	72%	80%	72%	80%	97%
Amman	57%	53%	53%	70%	52%	50%	52%	52%
Jarrar	53%	52%	53%	53%	55%	70%	70%	70%
Alishaa'	52%	57%	52%	62%	95%	52%	52%	52%
Nahawnd	60%	53%	60%	60%	83%	63%	80%	80%
Qersh	72%	53%	58%	63%	67%	52%	57%	57%
Asia	95%	52%	67%	67%	90%	62%	78%	78%
Shir (Shi3r)	55%	52%	87%	87%	82%	58%	83%	83%
Arafat	58%	52%	62%	50%	63%	67%	60%	82%
Cameron	60%	60%	58%	58%	50%	58%	82%	80%
Maliki	91%	35%	40%	40%	53%	38%	62%	59%
Baqara	53%	53%	53%	53%	55%	52%	65%	65%
Sakhr	47%	43%	42%	51%	62%	40%	55%	58%
Iqteran	55%	57%	63%	62%	65%	53%	62%	67%
Aziz	83%	55%	75%	82%	98%	60%	98%	98%
Ahram	68%	55%	53%	53%	70%	57%	58%	58%
Jalamah	87%	57%	62%	70%	63%	58%	58%	58%
Malek Abdullał		57%	95%	90%	97%	98%	95%	95%
Jamaa Arabiya		50%	50%	50%	68%	55%	95%	88%
Sakakini	68%	53%	72%	78%	93%	65%	93%	87%
Bursa	80%	52%	83%	62%	93%	88%	95%	93%
Ain	55%	52%	62%	63%	92%	53%	90%	90%
Thaheryah	73%	52%	55%	73%	55%	60%	68%	63%
Tarablus	52%	60%	52%	52%	95%	68%	93%	60%
Azhar	57%	52%	57%	62%	52%	52%	52%	52%
Arabiyah	97%	52%	57%	57%	58%	58%	58%	58%
	56%	38%	40%	47%	40%	38%	41%	64%
Asad								
Athraa'	67%	53%	53%	53%	87%	52%	90%	87%
	67% 52%	53% 55%	53% 52%	53% 52%	87% 88%	52% 58%	90% 88%	87% 88%
Athraa' Qedra	67% 52% t w/ s	53% 55% tw/s	53% 52% s t w/ s	53% 52% tw/s	87% 88% ip	52% 58% ip	90% 88% ip	87% 88% ip
Athraa' Qedra Dataset (Query)	67% 52% t w/ s sw	53% 55% tw/s 2-g	53% 52% s t w/ s sw_2-g	53% 52% t w/ s sw_2_3-;	87% 88% jp g sw	52% 58% ip 2-g	90% 88% ip sw_2-g	87% 88% ip ; sw_2_3-;
Athraa' Qedra Dataset (Query) Amazon	67% 52% t w/ s sw 95%	53% 55% t w/ s 2-g 57%	53% 52% s t w/ s sw_2-g 90%	53% 52% t w/ s sw_2_3-1 90%	87% 88% ip g sw 53%	52% 58% ip 2-g 52%	90% 88% ip sw_2-g 53%	87% 88% ip sw_2_3 - 53%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	67% 52% t w/ s sw 95% 80%	53% 55% t w/ s 2-g 57% 73%	53% 52% s t w/ s sw_2-g 90% 98%	53% 52% t w/ s sw_2_3- 90% 97%	87% 88% g sw 53% 67%	52% 58% ip 2-g 52% 52%	90% 88% ip sw_2-g 53% 67%	87% 88% ip sw_2_3 - 53% 67%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	67% 52% t w/ s sw 95% 80% 82%	53% 55% t w/ s 2-g 57% 73% 57%	53% 52% s t w/ s sw_2-g 90% 98% 72%	53% 52% t w/ s sw_2_3-; 90% 97% 53%	87% 88% g sw 53% 67% 52%	52% 58% ip 2-g 52% 52% 53% 53%	90% 88% ip sw_2-g 53% 67% 52%	87% 88% ip sw_2_3- 53% 67% 52%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	67% 52% t w/ s sw 95% 80% 82% 97%	53% 55% t w/s 2-g 57% 73% 57% 53%	53% 52% s t w/ s sw_2-g 90% 98% 72% 65%	$ \begin{array}{c c} 53\% \\ 52\% \\ \hline \mathbf{t w/s} \\ \mathbf{sw_2_3-} \\ 90\% \\ 97\% \\ 53\% \\ 65\% \\ \end{array} $	87% 88% ip g sw 53% 67% 52% 53%	52% 58% 2-g 52% 52% 52% 53% 53%	90% 88% ip sw_2-g 53% 67% 52% 53%	87% 88% ip 53% 67% 52% 55%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	67% 52% t w/ s sw 95% 80% 82% 97% 52%	53% 55% t w/ s 2-g 57% 73% 57% 53% 57%	53% 52% s t w/ s sw_2-g 90% 98% 72% 65% 52%	53% 52% tw/s sw_2_3-; 90% 97% 53% 65% 52%	87% 88% g sw 53% 67% 52% 53% 53%	52% 58% ip 2-g 52% 63% 63% 53% 53%	90% 88% ip sw_2-g 53% 67% 52% 53% 60%	87% 88% ip 53% 67% 52% 55% 73%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88%	53% 55% t w/s 2-g 57% 73% 57% 53% 57% 68%	53% 52% s t w/ s sw_2-g 90% 98% 72% 65% 52%	$\begin{array}{c c} 53\% \\ \hline 52\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2} \ 3\text{-} \\ 90\% \\ 90\% \\ 53\% \\ 65\% \\ 52\% \\ 63\% \end{array}$	87% 88% g sw 53% 67% 52% 53% 53% 77%	52% 58% ip 2-g 52% 63% 65% 53% 53% 53%	90% 88% ip sw_2-g 53% 67% 52% 53% 60% 73%	87% 88% 53% 67% 52% 55% 73% 75%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92%	53% 55% t w/s 2-g 57% 73% 57% 53% 57% 53% 55%	53% 52% s t w/ s sw_2-g 90% 98% 72% 65% 52% 65% 97%	$\begin{array}{c c} 53\% \\ \hline 52\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2_3-} \\ 90\% \\ 97\% \\ 53\% \\ 65\% \\ 65\% \\ 52\% \\ 63\% \\ 88\% \end{array}$	87% 88% ip g sw 53% 67% 52% 53% 77% 93%	52% 58% ip 2-g 53% 63% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 52%	90% 88% ip sw_2-g 53% 67% 52% 60% 73% 70%	87% 88% 53% 67% 53% 67% 52% 55% 73% 75% 70%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92% 100%	53% 55% t w/s 2-g 57% 73% 57% 68% 55% 65%	53% 52% s t w/s sw_2-g 90% 98% 72% 65% 52% 65% 97% 100%	$\begin{array}{c c} 53\%\\ \hline 52\%\\ \hline {\bf t} \ {\bf w}/\ {\bf s}\\ {\bf sw_2_3-}_1\\ 90\%\\ 97\%\\ \hline 53\%\\ \hline 65\%\\ \hline 52\%\\ \hline 65\%\\ \hline 52\%\\ \hline 88\%\\ \hline 100\%\\ \end{array}$	87% ip g sw 53% 67% 52% 53% 77% 93% 65%	52% 58% ip 2-g 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.3% 5.3% 5.3% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2%	90% 88% ip sw_2-g 0 53% 0 67% 0 53% 0 60% 0 73% 0 70% 0 65%	87% ip ss% 53% 67% 52% 55% 73% 75% 70% 65%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92%	53% 55% t w/s 2-g 57% 73% 57% 53% 57% 53% 55%	53% 52% s t w/ s sw_2-g 90% 98% 72% 65% 52% 65% 97%	$\begin{array}{c c} 53\% \\ \hline 52\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2_3-} \\ 90\% \\ 97\% \\ 53\% \\ 65\% \\ 65\% \\ 52\% \\ 63\% \\ 88\% \end{array}$	87% 88% ip g sw 53% 67% 52% 53% 77% 93%	52% 58% ip 2-g 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2% 5.3% 5.3% 5.3% 5.2% 5.2% 5.2% 5.2% 5.2% 5.2%	90% 88% ip sw_2-g 0 53% 0 67% 0 53% 0 60% 0 73% 0 70% 0 65%	87% 88% 53% 67% 53% 67% 52% 55% 73% 75% 70%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92% 100%	53% 55% t w/s 2-g 57% 73% 57% 68% 55% 65%	53% 52% s t w/s sw_2-g 90% 98% 72% 65% 52% 65% 97% 100%	$\begin{array}{c c} 53\%\\ \hline 52\%\\ \hline {\bf t} \ {\bf w}/\ {\bf s}\\ {\bf sw_2_3-}_1\\ 90\%\\ 97\%\\ \hline 53\%\\ \hline 65\%\\ \hline 52\%\\ \hline 65\%\\ \hline 52\%\\ \hline 88\%\\ \hline 100\%\\ \end{array}$	87% ip g sw 53% 67% 52% 53% 77% 93% 65%	52% ip 2-g 58% 63% 52% 53% <	90% 88% ip sw_2-g 53% 67% 52% 53% 60% 73% 665% 93%	87% ip 53% 67% 52% 55% 73% 75% 70% 65%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92% 100% 87%	53% 55% t w/s 2-g 57% 53% 57% 53% 57% 68% 55% 65% 77%	53% 52% sw_2sg 90% 98% 72% 65% 52% 665% 97% 100% 87%	$\begin{array}{c c} 53\%\\ \hline 52\%\\ \hline {\bf t} \ {\bf w} / \ {\bf s}\\ {\bf sw} _ 2_ 3{7}\\ 90\%\\ 97\%\\ \hline 53\%\\ \hline 65\%\\ \hline 52\%\\ \hline 63\%\\ \hline 88\%\\ \hline 100\%\\ \hline 83\%\\ \end{array}$	87% ip g sw 53% 67% 52% 53% 77% 93% 65% 53%	52% 58% ip 2-g 58% 6 52% 58% 2-g 53% <tr< td=""><td>90% 88% ip sw_2-g 53% 67% 52% 60% 73% 66% 93% 92%</td><td>87% ip 53% 67% 53% 67% 55% 73% 75% 70% 65% 93%</td></tr<>	90% 88% ip sw_2-g 53% 67% 52% 60% 73% 66% 93% 92%	87% ip 53% 67% 53% 67% 55% 73% 75% 70% 65% 93%
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Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c c} 67\% \\ 52\% \\ 52\% \\ \hline t w/s \\ sw \\ 95\% \\ 80\% \\ 82\% \\ 97\% \\ 52\% \\ 88\% \\ 92\% \\ 100\% \\ 87\% \\ 98\% \\ 60\% \\ 88\% \\ 88\% \\ 98\% \\ 60\% \\ 68\% \\ 88\% \\ 98\% \\ 61\% \\ 68\% \\ 92\% \\ 92\% \\ 92\% \\ 83\% \\ 63\% \\ 100\% \\ 65\% \\ 100\% \\ 65\% \\ 92\% \\ 92\% \\ 83\% \\ 63\% \\ 100\% \\ 65\% \\ 92\% \\ 92\% \\ 83\% \\ 63\% \\ 100\% \\ 65\% \\ 92\% \\ 92\% \\ 83\% \\ 63\% \\ 100\% \\ 80\% \\ $	53% 55% t w/ s 55% 2-g 57% 57% 57% 57% 57% 57% 57% 68% 55% 65% 55% 65% 55% 65% 55% 47% 53% 62% 57% 58% 98% 85% 63% 58% 93% 63% 52%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 53\% \\ \hline 52\% \\ \hline t w/s \\ 8w_2 a_3 \\ 90\% \\ 97\% \\ 65\% \\ 53\% \\ 65\% \\ 52\% \\ 63\% \\ 88\% \\ 100\% \\ 83\% \\ 88\% \\ 100\% \\ 83\% \\ 88\% \\ 100\% \\ 83\% \\ 95\% \\ 65\% \\ 100\% \\ 83\% \\ 98\% \\ 97\% \\ 93\% \\ 85\% \\ 65\% \\ 100\% \end{array}$	87% 88% ip g sw 53% 67% 53% 67% 53% 53% 53% 53% 53% 53% 53% 65% 66% 58% 67% 60% 58% 66% 58% 68% 73% 92% 62% 55% 62% 55% 62% 55% 55% 55% 55% 52% 52% 52%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	87% 88% ip 53% 67% 55% 73% 75% 70% 65% 93% 92% 68% 52% 55% 77% 92% 68% 52% 58% 61% 52% 77% 92% 68% 95% 95% 63% 60% 60% 60% 67%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92% 100% 87% 98% 60% 88% 97% 61% 66% 65% 92% 92% 92% 92% 92% 92% 92% 92% 92% 55%	53% 55% 1 w/ s 2-g 57% 73% 57% 53% 57% 68% 57% 68% 57% 68% 57% 68% 57% 68% 57% 68% 53% 47% 53% 62% 57% 98% 85% 93% 63% 52% 63% 52% 63%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	87% 88% ip g sw 53% 67% 53% 67% 53% 53% 53% 53% 53% 53% 67% 60% 55% 62% 55% 52% 55% 52% 55% 52% 55% 62% 55% 52% 55% 52% 53% 53% 53% 55% 52% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>87% 88% ip 53% 67% 52% 55% 73% 75% 70% 65% 93% 92% 68% 79% 55% 61% 63% 95% 77% 92% 68% 95% 63% 63% 63% 95% 63% 95% 77% 92% 63% 95% 77% 92% 63% 53%</td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	87% 88% ip 53% 67% 52% 55% 73% 75% 70% 65% 93% 92% 68% 79% 55% 61% 63% 95% 77% 92% 68% 95% 63% 63% 63% 95% 63% 95% 77% 92% 63% 95% 77% 92% 63% 53%
Athraa' Qedra Oataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92% 100% 87% 98% 60% 88% 97% 61% 66% 88% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92	53% 55% 1 w/ s 2-g 57% 73% 57% 53% 57% 68% 57% 68% 57% 68% 57% 68% 57% 68% 53% 62% 57% 58% 93% 63% 52% 63% 52% 63% 52% 63% 52% 63% 52% 63% 58%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 53\%\\ \hline 52\%\\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s}\\ \mathbf{sw} _ 2_3{1}\\ 90\%\\ 97\%\\ 53\%\\ \hline 53\%\\ 65\%\\ \hline 52\%\\ \hline 63\%\\ \hline 88\%\\ 100\%\\ \hline 88\%\\ 95\%\\ \hline 66\%\\ \hline 66\%\\ \hline 83\%\\ \hline 66\%\\ \hline 66\%\\ \hline 83\%\\ \hline 90\%\\ \hline 62\%\\ \hline 100\%\\ \hline 99\%\\ \hline 99\%\\ \hline 99\%\\ \hline 97\%\\ \hline 98\%\\ \hline 97\%\\ \hline 95\%\\ \hline 77\%\\ \hline 70\%\\ \hline 70\%\\ \hline \end{array}$	87% 88% ip g sw 53% 67% 52% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 65% 55% 62% 85% 62% 55% 52% <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>87% 88% ip 53% 53% 67% 52% 73% 75% 70% 65% 93% 92% 68% 61% 63% 52% 63% 53% 53%</td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	87% 88% ip 53% 53% 67% 52% 73% 75% 70% 65% 93% 92% 68% 61% 63% 52% 63% 53% 53%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	67% 52% t w/ s sw 95% 80% 82% 97% 52% 88% 92% 100% 87% 98% 60% 88% 97% 61% 66% 65% 92% 92% 92% 92% 92% 92% 92% 92% 92% 55%	53% 55% 1 w/ s 2-g 57% 73% 57% 53% 57% 68% 57% 68% 57% 68% 57% 68% 57% 68% 57% 68% 53% 47% 53% 62% 57% 98% 85% 93% 63% 52% 63% 52% 63%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	87% 88% ip g sw 53% 67% 53% 67% 53% 53% 53% 53% 53% 53% 67% 60% 55% 62% 55% 52% 55% 52% 55% 52% 55% 62% 55% 52% 55% 52% 53% 53% 53% 55% 52% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>87% 88% ip 53% 67% 52% 55% 73% 75% 70% 65% 93% 92% 68% 79% 58% 61% 63% 95% 63% 95% 63% 95% 63% 95% 63% 95% 63% 95% 53%</td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	87% 88% ip 53% 67% 52% 55% 73% 75% 70% 65% 93% 92% 68% 79% 58% 61% 63% 95% 63% 95% 63% 95% 63% 95% 63% 95% 63% 95% 53%

Table C.8: Per level and query weighted precision when using MBHA benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	77%	76%	89%	89%	59%	76%	67%	67%
Adnan Ibrahim	50%	76%	79%	79%	86%	82%	86%	97%
Amman	77%	76%	76%	78%	54%	50%	54%	54%
Jarrar	76%	75%	76%	76%	57%	81%	81%	81%
Alishaa'	59%	77%	59%	78%	95%	54%	54%	54%
Nahawnd	62%	76%	62%	62%	88%	79%	86%	86%
Qersh	82%	76%	77%	74%	80%	75%	77%	77%
Asia	95%	75%	80%	76%	92%	78%	85%	85%
Shir (Shi3r)	76%	75%	89%	89%	87%	77%	88%	88%
Arafat	77%	75%	78%	50%	79%	80%	78%	87%
Cameron	72%	72%	77%	77%	50%	77%	85%	86%
Maliki	92%	44%	72%	72%	53%	38%	69%	61%
Bagara	63%	63%	63%	63%	66%	59%	75%	75%
Sakhr	31%	53%	62%	64%	48%	64%	41%	43%
Iqteran	76%	77%	79%	78%	75%	59%	67%	80%
Aziz	85%	76%	75%	83%	98%	78%	98%	98%
Ahram	81%	76%	55%	55%	81%	77%	77%	77%
Jalamah	89%	77%	78%	81%	74%	70%	70%	70%
Malek Abdullal		77%	95%	92%	97%	98%	95%	95%
Jamaa Arabiya	50%	50%	50%	50%	81%	76%	95%	91%
Sakakini	81%	76%	82%	85%	94%	79%	94%	89%
Bursa	81%	75%	84%	67%	94%	91%	95%	94%
Ain	76%	75%	78%	79%	93%	76%	90%	91%
Thaheryah	83%	75%	76%	80%	66%	78%	81%	79%
Tarablus	52%	78%	52%	52%	95%	81%	93%	72%
Azhar	77%	75%	77%	73%	52%	59%	59%	59%
Arabiyah	97%	75%	77%	77%	77%	77%	77%	77%
mabiyan	5170		1170		11/0			1170
Acad	490%	790%	70%	76%	400%	550Z	560%	0.20%
Asad	42%	78%	79% 76%	76%	49%	55%	56%	83%
Athraa'	76%	76%	76%	76%	89%	75%	92%	89%
	76% 59%	76% 76%	76% 59%	76% 59%	89% 91%	75% 77%	92% 91%	89% 91%
Athraa' Qedra	76% 59% tw/s	76% 76% tw/s	76% 59% tw/s	76% 59% tw/s	89% 91% ip	75% 77% ip	92% 91% ip	89% 91% ip
Athraa' Qedra Dataset (Query)	76% 59% t w/ s sw	76% 76% tw/s 2-g	76% 59% tw/s sw_2-g	76% 59% t w/s sw_2_3-g	89% 91% j ip g sw	75% 77% ip 2-g	92% 91% ip sw_2-g	89% 91% ip sw_2_3-;
Athraa' Qedra Dataset (Query) Amazon	76% 59% t w/ s sw 95%	76% 76% t w/ s 2-g 77%	76% 59% t w/ s sw_2-g 90%	76% 59% t w/ s sw_2_3- 90%	89% 91% ip g sw 76%	75% 77% ip 2-g 555%	92% 91% ip sw_2-g 76%	89% 91% ip sw_2_3-1 76%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	76% 59% t w/ s sw 95% 84%	76% 76% t w/ s 2-g 77% 83%	76% 59% t w/ s sw_2-g 90% 98%	76% 59% t w/ s sw_2_3-g 90% 97%	89% 91% g sw 76% 73%	75% 77% ip 2-g 55%	92% 91% ip sw_2-g 76% 73%	89% 91% ip sw_2_3-1 76% 73%
Athraa' Qedra Dataset (Query) Amazon	76% 59% t w/ s sw 95% 84% 87%	76% 76% t w/ s 2-g 77% 83% 77%	76% 59% t w/ s sw_2-g 90%	76% 59% t w/ s sw_2_3- 90%	89% 91% ip g sw 76%	75% 77% ip 2-g 55%	92% 91% ip sw_2-g 76% 73%	89% 91% ip sw_2_3-; 76% 73% 75%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	76% 59% t w/ s sw 95% 84%	76% 76% t w/ s 2-g 77% 83%	76% 59% t w/ s sw_2-g 90% 98%	76% 59% t w/ s sw_2_3-g 90% 97%	89% 91% g sw 76% 73%	75% 77% ip 2-g 55% 71% 79%	92% 91% ip sw_2-g 76% 73% 75%	89% 91% ip sw_2_3-1 76% 73%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	76% 59% t w/ s sw 95% 84% 87%	76% 76% t w/ s 2-g 77% 83% 77%	76% 59% t w/ s sw_2-g 90% 98% 82%	T6% 59% t w/s sw_2_3-g 90% 97% 56%	89% 91% ip g sw 76% 73% 75%	75% 77% ip 2-g 55% 71% 79% 76%	92% 91% ip sw_2-g 76% 73% 75% 76%	89% 91% ip sw_2_3-; 76% 73% 75%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	76% 59% t w/ s sw 95% 84% 87% 97%	76% 76% t w/ s 2-g 77% 83% 77% 76%	76% 59% tw/s sw_2-g 90% 98% 82% 66%	T6% 59% tw/s sw_2_3-g 90% 97% 56% 66%	89% 91% ip g sw 76% 73% 75% 76%	75% 77% ip 2-g 55% 71% 79% 76% 76%	92% 91% ip sw_2-g 76% 73% 75% 76% 666%	89% 91% ip sw_2_3-; 76% 73% 75% 76%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	$\begin{array}{c c} 76\% \\ 59\% \\ \hline t w/s \\ sw \\ 95\% \\ 84\% \\ 87\% \\ 97\% \\ 53\% \\ 91\% \end{array}$	76% 76% tw/s 2-g 77% 83% 77% 76% 77% 76% 77% 76%	T6% 59% t w/s sw_2-g 90% 98% 82% 66% 54% 70%	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{s} \mathbf{w} _ 2 \ 3 - \mathbf{g} \\ 90\% \\ 97\% \\ \hline 56\% \\ 66\% \\ 54\% \\ 67\% \end{array}$	89% 91% ip g sw 76% 73% 75% 76% 84%	75% 77% ip 2-g 555% 71% 79% 76% 76% 556%	92% 91% ip sw_2-g 76% 75% 76% 76% 83%	89% 91% ip sw_2_3- 76% 73% 75% 76% 76% 83%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	76% 59% t w/ s sw 95% 84% 87% 97% 53%	76% 76% t w/ s 2-g 77% 83% 77% 76% 77% 76%	T6% 59% sw_2-g 90% 98% 82% 666% 54%	T6% 59% tw/s sw_2_3-g 90% 97% 56% 66% 54%	89% 91% ip g sw 76% 73% 75% 76% 76%	75% 77% ip 2-g 55% 71% 79% 76% 76% 55% 71%	92% 91% ip sw_2-g 6 76% 73% 75% 76% 6 66% 6 83% 5 78%	89% 91% ip sw_2_3-; 76% 75% 76% 76%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	76% 59% t w/s sw 95% 84% 87% 97% 53% 91% 93% 100%	76% 76% t w/s 2-g 77% 83% 77% 76% 77% 76% 77% 76% 77% 76% 77% 76% 74% 76% 79%	76% 59% sw_2-g 90% 98% 82% 66% 54% 70% 97% 100%	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{s} \mathbf{w} _ 2 _ 3 - \mathbf{g} \\ 90\% \\ 97\% \\ 56\% \\ 66\% \\ 66\% \\ 54\% \\ 67\% \\ 91\% \\ 100\% \end{array}$	89% 91% ip g sw 76% 75% 76% 76% 84% 94% 79%	75% 77% ip 2-g 55% 71% 655% 71% 676% 76% 55% 71% 77%	92% 91% ip sw_2-g 76% 75% 76% 76% 76% 78% 78% 78% 78% 78% 78% 78% 78%	89% 91% ip sw_2_3-; 76% 75% 76% 76% 76% 76% 78% 78% 79%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	76% 59% t w/ s sw 95% 84% 87% 97% 53% 91% 93% 100% 89%	76% 76% t w/s 2-g 77% 83% 77% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 79% 84%	76% 59% 3 t w/s sw_2s 90% 98% 66% 54% 70% 97% 100% 89%	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline {\bf t w/s} \\ {\bf sw_2_3-}_{4} \\ 90\% \\ \hline 90\% \\ \hline 97\% \\ \hline 66\% \\ \hline 66\% \\ \hline 54\% \\ \hline 67\% \\ \hline 91\% \\ \hline 100\% \\ \hline 88\% \\ \end{array}$	89% 91% ip g sw 76% 75% 76% 76% 94% 94% 76% 76%	75% ip 2-g 55% 71% 65% 71% 67% 67% 67% 67% 76% 76% 76% 76% 76% 76% 76% 76% 76% 75% 75% 75% 79%	92% 91% ip sw_2sg 5 76% 6 73% 6 76% 6 66% 6 83% 6 78% 79% 94%	89% 91% ip sw_2_3- 76% 73% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 78% 79% 94%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	76% 59% t w/ s sw 95% 84% 53% 97% 53% 91% 93% 100% 89%	76% 76% 2-g 77% 83% 77% 76% 77% 76% 77% 76% 77% 84% 81%	76% 59% it w/s sw_2-g 90% 98% 66% 54% 70% 97% 100% 89% 95%	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2 \ 3 - \mathbf{g} \\ 90\% \\ 97\% \\ \hline 56\% \\ 66\% \\ 54\% \\ 67\% \\ 91\% \\ 100\% \\ 88\% \\ 95\% \end{array}$	89% 91% ip g sw 76% 75% 76% 76% 94% 99% 76% 94% 79% 76% 91%	75% 77% ip 2-g 55% 71% 79% 76% 86%	92% 91% ip sw_2-g 76% 73% 66% 83% 78% 79% 93%	89% 91% ip sw_2_3- 76% 73% 76% 76% 76% 76% 76% 76% 94% 93%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	76% 59% t w/s 95% 84% 87% 97% 53% 91% 93% 100% 98% 72%	76% 76% 76% tw/s 2-g 77% 83% 76% 77% 76% 77% 76% 76% 76% 76% 83% 84% 81% 66%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2_3- \mathbf{g} \\ 90\% \\ 97\% \\ 56\% \\ 66\% \\ 64\% \\ 67\% \\ 91\% \\ 100\% \\ 88\% \\ 95\% \\ 83\% \end{array}$	89% 91% ip g sw 76% 76% 76% 75% 76% 76% 94% 94% 79% 76% 84% 94% 91% 80% 80%	75% 77% ip 2-g 55% 71% 6 75% 76% 76% 76% 76% 76% 76% 75% 75% 75% 75% 75% 75% 75% 75% 75% 79% 86% 79%	92% 91% ip sw_2-g 5 76% 6 75% 6 75% 6 76% 6 83% 6 79% 94% 94% 6 93% 6 81%	89% 91% ip sw_2_3-; 76% 75% 76% 76% 76% 78% 79% 94% 93% 81%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	76% 59% sw 95% 84% 97% 53% 91% 93% 100% 89% 98% 72% 91%	76% 76% 76% 2-g 77% 83% 77% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 79% 84% 81% 66% 36%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{s} \ \mathbf{w} _ 2 \ 3 - \mathbf{g} \\ 90\% \\ 97\% \\ 56\% \\ 66\% \\ \hline 54\% \\ 67\% \\ 91\% \\ 100\% \\ 88\% \\ 95\% \\ 95\% \\ 83\% \\ 66\% \end{array}$	89% 91% 91% ip g sw 76% 73% 75% 76% 76% 76% 91% 94% 99% 96% 84% 94% 99% 76% 84% 94% 84% 84% 91% 80% 82% 82%	75% 77% ip 2-g 55% 71% 6 76% 76% 76% 76% 76% 76% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 79% 86% 79% 79% 79%	92% 91% ip sw_2rg 5 76% 6 75% 6 76% 6 78% 6 78% 6 78% 6 93% 93% 81% 6 87%	89% 91% ip sw_2_3-; 76% 75% 76% 76% 76% 78% 78% 94% 93% 81% 86%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	76% 59% t w/ s sw 95% 84% 97% 53% 91% 93% 100% 89% 98% 72% 91% 97%	76% 76% 76% t w/ s 2-g 77% 83% 77% 76% 76% 83% 77% 84% 81% 66% 36% 63%	76% 59% sw_2sg 90% 98% 66% 54% 70% 97% 90% 95% 52% 52% 88%	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2 \ 3 - \mathbf{g} \\ 90\% \\ \hline 90\% \\ \hline 90\% \\ \hline 56\% \\ \hline 66\% \\ \hline 54\% \\ \hline 67\% \\ \hline 010\% \\ \hline 88\% \\ \hline 95\% \\ \hline 83\% \\ \hline 66\% \\ \hline 88\% \\ \hline \end{array}$	89% 91% 91% ip g sw 76% 76% 76% 76% 76% 76% 94% 79% 76% 84% 91% 80% 82% 77%	75% 77% ip 2-g 55% 77% 0 71% 71% 71% 71% 71% 75% 76% 76% 76% 76% 76% 75% <tr< td=""><td>92% 91% ip sw_2sg 5 76% 6 73% 6 76% 6 76% 6 76% 6 76% 6 76% 6 83% 78% 94% 93% 81% 6 87% 77% 77%</td><td>89% 91% ip sw_2_3- 76% 73% 76% 76% 76% 76% 76% 94% 93% 81% 86% 77%</td></tr<>	92% 91% ip sw_2sg 5 76% 6 73% 6 76% 6 76% 6 76% 6 76% 6 76% 6 83% 78% 94% 93% 81% 6 87% 77% 77%	89% 91% ip sw_2_3- 76% 73% 76% 76% 76% 76% 76% 94% 93% 81% 86% 77%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	76% 59% sw 95% 84% 87% 91% 93% 100% 89% 98% 72% 91% 97% 43%	76% 76% 76% 1 w/s 2-g 77% 83% 77% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 66% 36% 34%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2_3{\mathbf{f}} \\ 90\% \\ 97\% \\ 56\% \\ 66\% \\ 67\% \\ 91\% \\ 100\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 66\% \\ 88\% \\ 42\% \end{array}$	89% 91% ip g sw 76% 76% 84% 94% 91% 88% 91% 88% 91% 80% 82% 76% 77% 80% 82% 77% <td>75% 77% ip 2-g 55% 71% 6 76% 6 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77%</td> <td>92% 91% ip sw_2-g 5 76% 6 75% 6 76% 6 76% 6 76% 6 76% 6 78% 6 79% 6 94% 93% 81% 6 77% 6 76%</td> <td>89% 91% ip sw_2_3- 76% 75% 76% 76% 76% 78% 94% 93% 81% 86% 77% 76%</td>	75% 77% ip 2-g 55% 71% 6 76% 6 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77%	92% 91% ip sw_2-g 5 76% 6 75% 6 76% 6 76% 6 76% 6 76% 6 78% 6 79% 6 94% 93% 81% 6 77% 6 76%	89% 91% ip sw_2_3- 76% 75% 76% 76% 76% 78% 94% 93% 81% 86% 77% 76%
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Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakkini Bursa	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 77% 83% 77% 76% 77% 83% 76% 77% 83% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2_3{\mathbf{f}} \\ 90\% \\ 97\% \\ \hline 56\% \\ \hline 66\% \\ \hline 54\% \\ 67\% \\ \hline 67\% \\ \hline 67\% \\ \hline 91\% \\ 100\% \\ \hline 88\% \\ 95\% \\ \hline 88\% \\ 95\% \\ \hline 83\% \\ \hline 66\% \\ \hline 88\% \\ 42\% \\ \hline 78\% \\ \hline 100\% \\ \hline 88\% \\ 91\% \\ \hline 91\% \\ \hline 91\% \\ \hline 91\% \\ \hline 94\% \\ \hline 94\% \\ \hline 86\% \\ \hline \end{array}$	89% 91% 91% ip g sw 76% 76% 76% 76% 76% 76% 94% 94% 94% 79% 76% 84% 94% 79% 76% 80% 80% 80% 57% 86% 87% 88% 69% 83% 93% 73%	75% 77% ip 2-sg 55% 71% 6 76% 76% 76% 76% 76% 76% 76% 75% 75% 75% 79% 79% 79% 79% 79% 79% 53% 75% 53% 75% 53% 75% 53% 75% <t< td=""><td>92% 91% ip sw_2rg 5 76% 6 75% 6 75% 6 76% 6 83% 78% 693% 93% 93% 6 87% 6 87% 6 81% 5 54% 6 83% 73% 60% 6 83% 73% 666%</td><td>89% 91% ip sw_2_3- 76% 75% 76% 76% 78% 79% 94% 93% 81% 76% 79% 94% 93% 81% 86% 77% 85% 81% 95% 84% 93% 74%</td></t<>	92% 91% ip sw_2rg 5 76% 6 75% 6 75% 6 76% 6 83% 78% 693% 93% 93% 6 87% 6 87% 6 81% 5 54% 6 83% 73% 60% 6 83% 73% 666%	89% 91% ip sw_2_3- 76% 75% 76% 76% 78% 79% 94% 93% 81% 76% 79% 94% 93% 81% 86% 77% 85% 81% 95% 84% 93% 74%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 77% 83% 77% 76% 77% 83% 76% 76% 76% 76% 76% 76% 76% 76% 76% 79% 84% 81% 66% 63% 36% 73% 73% 73% 73% 70% 88% 94% 94% 77%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{s} \ \mathbf{w} _ 2 \ 3 - \mathbf{g} \\ 90\% \\ 97\% \\ \hline 56\% \\ 66\% \\ 54\% \\ 66\% \\ 91\% \\ 88\% \\ 95\% \\ 95\% \\ 83\% \\ 66\% \\ 88\% \\ 42\% \\ 100\% \\ 88\% \\ 42\% \\ 100\% \\ 91\% \\ 88\% \\ 99\% \\ 91\% \\ 88\% \\ 98\% \\ 97\% \\ 94\% \\ 86\% \\ 75\% \end{array}$	89% 91% 91% 91% 91% 91% 91% 91% 76% 76% 76% 76% 94% 91% 91% 94% 76% 80% 77% 80% 76% 76% 80% 76% 80% 93% 73% 80% 93% 73% 66%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	89% 91% ip sw_2_3- 76% 75% 76% 76% 76% 78% 78% 79% 94% 93% 81% 86% 77% 85% 81% 95% 84% 93% 74% 68%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 77% 83% 77% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 79% 84% 59% 73% 70% 98% 88% 79% 77% 59% 79%	76% 59% sw_2rg 90% 98% 82% 66% 54% 70% 97% 100% 89% 95% 72% 52% 88% 98% 98% 98% 98% 98% 98% 94% 86% 75% 100% 83%	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw}_2_3{\mathbf{f}} \\ 90\% \\ 97\% \\ \hline 56\% \\ 66\% \\ \hline 54\% \\ 67\% \\ 67\% \\ \hline 0100\% \\ 88\% \\ 91\% \\ 100\% \\ 88\% \\ 95\% \\ \hline 33\% \\ 66\% \\ 88\% \\ 95\% \\ \hline 100\% \\ 88\% \\ 99\% \\ 91\% \\ 91\% \\ 88\% \\ 98\% \\ 97\% \\ 91\% \\ 88\% \\ 98\% \\ 97\% \\ 91\% \\ 84\% \\ \hline \end{array}$	89% 91% ip g sw 76% 76% 75% 76% 76% 76% 76% 84% 91% 94% 79% 76% 80% 82% 77% 76% 80% 83% 91% 87% 76% 87% 73% 66% 75% 76% 75% 76% 75% 76% 75% 76%	75% 77% ip 2-gg 55% 71% 6 76% 76% 76% 76% 76% 75% 75% 75% 75% 75% 75% 75% 75% 75% 63% 63% 50% 76% 75% 75% 75% 75% 63% 75% 75% 75% 75% 75% 75% 76% 77% 80% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73% <t< td=""><td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td><td>89% 91% ip x.2_3- 76% 75% 76% 78% 79% 94% 93% 81% 86% 77% 76% 79% 94% 93% 81% 85% 81% 95% 93% 74% 80% 76%</td></t<>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	89% 91% ip x.2_3- 76% 75% 76% 78% 79% 94% 93% 81% 86% 77% 76% 79% 94% 93% 81% 85% 81% 95% 93% 74% 80% 76%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 2-g 77% 83% 77% 83% 76% 77% 83% 76% 77% 83% 76% 77% 84% 81% 36% 36% 36% 36% 93% 88% 94% 79% 77% 99% 77% 79% 77% 79% 77% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} _ 2 _ 3 - \mathbf{g} \\ 90\% \\ 97\% \\ \hline 56\% \\ \hline 66\% \\ \hline 54\% \\ 67\% \\ 91\% \\ \hline 88\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 91\% \\ 100\% \\ \hline 88\% \\ 88\% \\ 42\% \\ \hline 78\% \\ 100\% \\ 91\% \\ 91\% \\ 94\% \\ 94\% \\ \hline 94\% \\ 86\% \\ \hline 75\% \\ 100\% \\ 100\% \\ \hline 84\% \\ 69\% \\ \hline \end{array}$	89% 91% 91% ip g sw 76% 76% 76% 76% 76% 76% 94% 94% 94% 79% 76% 84% 94% 79% 76% 81% 80% 82% 77% 88% 69% 83% 93% 73% 66% 75% 76% 76% 73% 66% 73% 76% 73% 76% 73% 73% 73% 73%	75% 77% ip 2-sg 55% 71% 55% 71% 6 76% 76% 76% 76% 76% 75% 75% 75% 75% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 79% 75% 75% 75% 75% 75% 75% 75% 77% 80% 73% 73% 73% 73% 73% 73% 73% 73% 6 73% 6 73% 73%	92% 91% ip sw_2-g 76% 76% 76% 76% 76% 76% 93% 93% 93% 81% 87% 76% 81% 87% 76% 83% 93% 81% 87% 54% 83% 93% 654% 83% 93% 54% 666% 80% 76% 76%	89% 91% ip sw_2_3- 76% 75% 76% 76% 76% 78% 79% 94% 93% 81% 86% 77% 81% 86% 76% 75% 81% 93% 81% 95% 81% 93% 74% 68% 80% 76% 76%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 77% 83% 77% 76% 76% 77% 74% 76% 76% 76% 79% 84% 81% 66% 36% 73% 73% 73% 73% 73% 70% 88% 94% 79% 59% 70% 70% 70% 70% 70% 70% 70% 70% 70%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2 _ 3 - \mathbf{g} \\ 90\% \\ \hline 97\% \\ \hline 56\% \\ \hline 66\% \\ \hline 54\% \\ \hline 66\% \\ \hline 91\% \\ \hline 000\% \\ \hline 88\% \\ 95\% \\ \hline 95\% \\ \hline 83\% \\ \hline 66\% \\ \hline 88\% \\ \hline 42\% \\ \hline 78\% \\ \hline 100\% \\ \hline 88\% \\ \hline 99\% \\ \hline 86\% \\ \hline 75\% \\ \hline 100\% \\ \hline 69\% \\ \hline 81\% \\ \hline \end{array}$	89% 91% 91% 91% 91% 91% 91% 91% 76% 76% 76% 76% 76% 91% 94% 91% 80% 76% 80% 76% 80% 76% 76% 83% 93% 75% 66% 75% 76% 75% 76% 75% 76% 75% 76% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72%	75% 77% ip 2-sg 55% 71% 6 76% 76% 76% 76% 76% 75% 80% 75% 80% 73% 75% 75% 80% 73% 75% 75% 75% 75% 75% 75% 75% <t< td=""><td>92% 91% ip sw_2rg 5 76% 6 75% 76% 66% 83% 79% 94% 93% 94% 93% 94% 93% 81% 87% 5 76% 6 81% 5 87% 6 81% 5 84% 5 83% 6 83% 6 83% 6 83% 6 80% 73% 66% 76% 76% 76% 76% 76% 76%</td><td>89% 91% ip w_2_3-; 76% 75% 76% 76% 76% 78% 79% 94% 93% 81% 86% 77% 95% 81% 95% 84% 93% 94% 95% 84% 93% 74% 68% 80% 76% <</td></t<>	92% 91% ip sw_2rg 5 76% 6 75% 76% 66% 83% 79% 94% 93% 94% 93% 94% 93% 81% 87% 5 76% 6 81% 5 87% 6 81% 5 84% 5 83% 6 83% 6 83% 6 83% 6 80% 73% 66% 76% 76% 76% 76% 76% 76%	89% 91% ip w_2_3-; 76% 75% 76% 76% 76% 78% 79% 94% 93% 81% 86% 77% 95% 81% 95% 84% 93% 94% 95% 84% 93% 74% 68% 80% 76% <
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 2 \text{-g} \\ 33\% \\ \hline 77\% \\ 83\% \\ \hline 77\% \\ 76\% \\ \hline 76\% \\ \hline 79\% \\ 84\% \\ \hline 81\% \\ 66\% \\ \hline 79\% \\ \hline 84\% \\ \hline 36\% \\ \hline 63\% \\ \hline 63\% \\ \hline 66\% \\ \hline 36\% \\ \hline 63\% \\ \hline 79\% \\ \hline 74\% \\ \hline 75\% \hline 75\% \\ \hline 75\% \hline 75\% \\ \hline 75\% \hline 7$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2_3- \mathbf{g} \\ 90\% \\ 97\% \\ \hline 56\% \\ 66\% \\ \hline 67\% \\ 91\% \\ 100\% \\ 88\% \\ 88\% \\ 95\% \\ \hline 88\% \\ 66\% \\ \hline 88\% \\ 42\% \\ \hline 78\% \\ 100\% \\ 91\% \\ 88\% \\ 99\% \\ 97\% \\ 91\% \\ 88\% \\ 98\% \\ 97\% \\ 100\% \\ 84\% \\ \hline 69\% \\ 81\% \\ 96\% \\ \end{array}$	89% 91% ip g sw 76% 76% 75% 76% 76% 84% 91% 94% 79% 76% 84% 94% 91% 80% 82% 77% 76% 88% 69% 83% 93% 73% 66% 75% 76% 76% 75% 76% 75% 76% 75% 76% 75% 76% 75% 76% 75% 76% 75% 76% 75% 76% 75% 76% 77% 86%	75% 77% ip 2-gg 55% 71% 6 76% 76% 76% 77% 6 76% 75% 75% 75% 79% 63% 63% 63% 76% 77% 63% 75% 77% 63% 77% 63% 77% 63% 77% 63% 77% 63% 77% 63% 77% 63% 77% 75% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77%	92% 91% ip sw_2-g 5 76% 5 75% 6 76% 5 76% 6 76% 6 66% 83% 79% 6 94% 6 93% 6 94% 76% 94% 87% 77% 6 94% 81% 77% 6 84% 77% 54% 83% 54% 83% 93% 73% 93% 76% 80% 76% 80% 76% 80%	89% 91% ip sw_2_3-; 76% 75% 76% 78% 79% 94% 93% 81% 86% 77% 76% 75% 93% 81% 93% 81% 95% 81% 95% 84% 93% 74% 68% 76% 76% 76% 76% 76% 76% 76% 73%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 77% 83% 77% 76% 76% 77% 74% 76% 76% 76% 79% 84% 81% 66% 36% 73% 73% 73% 73% 73% 70% 88% 94% 79% 59% 70% 70% 70% 70% 70% 70% 70% 70% 70%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2 _ 3 - \mathbf{g} \\ 90\% \\ \hline 97\% \\ \hline 56\% \\ \hline 66\% \\ \hline 54\% \\ \hline 66\% \\ \hline 91\% \\ \hline 000\% \\ \hline 88\% \\ 95\% \\ \hline 95\% \\ \hline 83\% \\ \hline 66\% \\ \hline 88\% \\ \hline 42\% \\ \hline 78\% \\ \hline 100\% \\ \hline 88\% \\ \hline 99\% \\ \hline 86\% \\ \hline 75\% \\ \hline 100\% \\ \hline 69\% \\ \hline 81\% \\ \hline \end{array}$	89% 91% 91% 91% 91% 91% 91% 91% 76% 76% 76% 76% 76% 91% 94% 91% 80% 76% 80% 76% 80% 76% 76% 83% 93% 75% 66% 75% 76% 75% 76% 75% 76% 75% 76% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	92% 91% ip sw_2-g 76% 775% 775% 775% 775% 775% 775% 775% 775% 775% 775% 775% 775% 775% 779% 93% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 73% 80% 83% 73% 666% 80% 77% 77% 77% 73% 666% 80% 76% 76% 76% 76% 76% 76% 76% 76% </td <td>89% 91% ip sw_2_3-; 76% 75% 76% 76% 78% 78% 78% 78% 79% 94% 93% 81% 86% 77% 95% 84% 93% 74% 68% 80% 76% 76% 76% 76% 74% 68% 80% 76%</td>	89% 91% ip sw_2_3-; 76% 75% 76% 76% 78% 78% 78% 78% 79% 94% 93% 81% 86% 77% 95% 84% 93% 74% 68% 80% 76% 76% 76% 76% 74% 68% 80% 76%

C.3.2 Bing/Clear Queries

Table C.9: Per level and query macro F-measure when using MBHA benchmarks for Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	47%	37%	47%	50%	79%	58%	55%	55%
Adnan Ibrahim	88%	69%	88%	65%	98%	52%	52%	52%
Amman	85%	40%	85%	85%	48%	44%	93%	93%
Jarrar	71%	47%	47%	47%	79%	40%	47%	47%
Alishaa'	79%	38%	83%	83%	58%	40%	50%	50%
Nahawnd	67%	44%	47%	47%	95%	44%	95%	95%
Qersh	88%	39%	52%	52%	95%	47%	86%	86%
Asia	86%	44%	67%	63%	95%	47%	95%	93%
Shir (Shi3r)	47%	47%	47%	47%	50%	40%	50%	50%
Arafat	88%	52%	92%	87%	68%	40%	76%	76%
Cameron	73%	44%	66%	66%	55%	44%	55%	55%
Maliki	49%	25%	53%	53%	70%	33%	61%	61%
Baqara	59%	46%	51%	51%	83%	44%	50%	50%
Sakhr	48%	49%	47%	47%	93%	76%	93%	47%
Iqteran	38%	38%	38%	38%	47%	44%	55%	98%
Aziz	77%	73%	83%	83%	69%	83%	83%	83%
Ahram	74%	36%	75%	75%	63%	40%	95%	95%
Jalamah	75%	52%	65%	65%	88%	52%	85%	85%
Malek Abdullah	92%	55%	85%	85%	100%	100%	100%	100%
Jamaa Arabiya	59%	92%	95%	98%	92%	92%	50%	95%
Sakakini	47%	44%	47%	47%	98%	50%	98%	98%
Bursa	77%	81%	79%	77%	100%	93%	98%	98%
Ain	51%	40%	47%	47%	78%	44%	81%	81%
Thaheryah	71%	40%	71%	71%	90%	60%	60%	60%
Tarablus	79%	40%	79%	69%	85%	50%	88%	88%
Azhar	75%	50%	75% 71%	75% 47%	86%	$\frac{52\%}{44\%}$	75% 58%	75%
A 1 1 1	F 1 07				65%			58%
Arabiyah	71%	44%						
Asad	33%	33%	66%	66%	49%	40%	56%	89%
Asad Athraa'	33% 98%	33% 40%	66% 95%	66% 95%	49% 85%	40%	56% 93%	89% 93%
Asad	33% 98% 97%	33% 40% 40%	66% 95% 93%	66% 95% 93%	49% 85% 56%	40% 44% 40%	56% 93% 58%	89% 93% 58%
Asad Athraa' Qedra	33% 98% 97% t w/ s	33% 40% 40% t w /	66% 95% 93% s t w/	66% 95% 93% s t w/ s	49% 85% 56% ip	40% 44% 40% ip	56% 93% 58% ip	89% 93% 58% ip
Asad Athraa' Qedra Dataset (Query)	33% 98% 97% tw/s sw	33% 40% 40% t w/ 2-g	66% 95% 93% s t w/ sw_2-	66% 95% 93% s t w/ s -g sw_2_3	49% 85% 56% -g sw	40% 44% 40% ip 2-g	56% 93% 58% ip sw_2-g	89% 93% 58% ip sw_2_3-g
Asad Athraa' Qedra Dataset (Query) Amazon	33% 98% 97% t w/ s sw 55%	33% 40% 40% t w/ 2-g 58%	66% 95% 93% s t w/ sw_2- 55%	66% 95% 93% s t w/ s -g sw_2_3 55%	49% 85% 56% -g sw 98%	40% 44% 40% ip 2-g 5 74%	56% 93% 58% ip sw_2-g 97%	89% 93% 58% ip sw_2_3-g 97%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	33% 98% 97% t w/ s sw 55% 65%	33% 40% 40% t w/ 2-g 58% 86%	66% 95% 93% s t w/ sw_2- 55% 55%	66% 95% 93% s t w/ s -g sw_2_3 55% 100%	49% 85% 56% -g sw 98% 90%	40% 44% 40% ip 2-g 74% 60%	56% 93% 58% ip sw_2-g 97% 50%	89% 93% 58% ip sw_2_3-g 97% 50%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	33% 98% 97% t w/ s sw 55% 65% 100%	33% 40% 40% 40% 58% 86% 40%	66% 95% 93% s t w/ sw_2- 55% 55% 98%	66% 95% 93% s t w/ s -g sw_2_3 55% 100% 98%	49% 85% 56% • ip - g sw 98% 90% 47%	40% 44% 40% ip 2-g 5 74% 5 60% 5 37%	56% 93% 58% ip sw_2-g 97% 50% 49%	89% 93% 58% ip sw_2_3-g 97% 50% 49%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	33% 98% 97% t w/ s sw 55% 65% 100% 47%	33% 40% 40% 58% 86% 40%	66% 95% 93% s t w/ sw_2- 55% 55% 98% 47%	66% 95% 93% s t w/s -g sw_2_3 55% 100% 98% 47%	49% 85% 56% -g sw 98% 90% 47% 43%	40% 44% 40% ip 2-g 5 74% 5 60% 5 37% 5 44%	56% 93% 58% ip sw_2-g 97% 50% 49% 56%	89% 93% 58% ip sw_2_3-g 97% 50% 49% 50%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	33% 98% 97% t w/ s sw 55% 65% 100% 47% 46%	33% 40% 40% 58% 86% 40% 40%	66% 95% 93% s t w/ sw_2 55% 55% 98% 47% 95%	66% 95% 93% s t w/s g sw_2_3 55% 100% 98% 47% 95%	49% 85% 56% -g sw 98% 90% 47% 43% 50%	40% 44% 40% ip 2-g 5 74% 5 60% 5 37% 5 44% 5 46%	56% 93% 58% ip sw_2-g 97% 50% 49% 56% 65%	89% 93% 58% ip sw_2_3-g 97% 50% 49% 50% 81%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	33% 98% 97% t w/ s 55% 65% 100% 47% 46% 98%	33% 40% 40% 40% 58% 86% 40% 44% 38% 44%	$\begin{array}{c c} 66\% \\ \hline 95\% \\ \hline 93\% \\ \hline s & t w/ \\ \hline sw_2 \\ 55\% \\ \hline 55\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ \hline 98\% \\ \end{array}$	66% 95% 93% s t w/s g sw_23 55% 100% 98% 47% 95% 98%	49% 85% 56% -g 98% 90% 47% 43% 50% 55%	40% 44% 40% ip 2-g 5 74% 5 60% 5 37% 5 44% 5 46% 5 44%	56% 93% 58% ip sw_2-g 97% 50% 49% 56% 65% 55%	89% 93% 58% ip sw_2_3-g 97% 50% 49% 50% 81% 55%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	33% 98% 97% t w/ s sw 55% 65% 100% 46% 98% 100%	33% 40% 40% 58% 86% 40% 40%	66% 95% 93% s t w/ ssw_2- 55% 98% 47% 95% 98% 80%	66% 95% 93% s t w/s g sw_2_3 55% 100% 98% 47% 95% 98% 47% 98% 80% 80%	49% 85% 56% -g 98% 90% 47% 50% 55% 55%	40% 44% 40% 2-g 5 74% 5 60% 5 37% 5 46% 5 44% 5 46% 5 44%	56% 93% 58% ip sw_2-g 97% 50% 49% 65% 55% 73%	89% 93% 58% ip sw_2_3-g 97% 50% 49% 50% 81% 55% 73%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	33% 98% 97% t w/ s sw 55% 65% 100% 47% 46% 98% 100%	33% 40% 40% 40% 40% 58% 86% 40% 38% 44% 38% 44% 100%	66% 95% 93% s t w/ \$55% \$55% 98% 47% 98% 47% 98% 80% 0100%	66% 95% 93% s t w/s sg sw_2_3 55% 100% 98% 47% 95% 98% 98% 100% 98% 100%	49% 85% 56% ip -g 98% 90% 47% 43% 50% 55% 65% 83%	40% 44% 40% ip 2-g 74% 60% 37% 44% 44% 44% 40% 44% 44% 44% 44% 44% 44% 44% 40% 79%	56% 93% 58% ip sw_2-g 97% 50% 56% 55% 73% 85%	89% 93% 58% ip sw_2_3-g 97% 50% 49% 50% 81% 73% 88%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	33% 98% 97% t w/ s sw 55% 65% 100% 46% 98% 100%	33% 40% 40% 40% 58% 86% 40% 44% 38% 44% 40%	66% 95% 93% s t w/ ssw_2- 55% 98% 47% 95% 98% 80%	$\begin{array}{c c} 66\% \\ \hline 95\% \\ \hline 93\% \\ \hline s \\ t \\ w/s \\ s \\ \hline s \\ s \\ -g \\ s \\ s \\ -g \\ s \\ s \\ -g \\ -g$	49% 85% 56% -g 98% 90% 47% 50% 55% 55%	40% 44% 40% ip 2-g 6 74% 5 60% 5 44% 6 44% 6 44% 5 44% 6 40% 6 40% 6 40% 5 44% 6 40% 5 79% 5 44%	56% 93% 58% ip sw_2-g 97% 50% 49% 65% 55% 73%	$\begin{array}{c c} 89\% \\ \hline 93\% \\ \hline 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw} 2 - 3 - \mathbf{g} \\ 97\% \\ \hline 50\% \\ 49\% \\ 50\% \\ \hline 81\% \\ \hline 55\% \\ 73\% \\ 88\% \\ \hline 54\% \\ \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	33% 98% 97% t w/ s 55% 65% 100% 47% 46% 98% 100% 100% 47%	33% 40% 40% t w/ 2-g 58% 86% 40% 44% 38% 44% 38% 44% 57%	$\begin{array}{c c} 66\% \\ \hline 95\% \\ 93\% \\ \hline s \\ t \\ sw_2 \\ 55\% \\ 55\% \\ 55\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ 80\% \\ 80\% \\ 0 \\ 100\% \\ 47\% \end{array}$	$\begin{array}{c c} 66\% \\ \hline 95\% \\ \hline 93\% \\ \hline s \\ t \\ w/s \\ s \\ \hline s \\ s \\ -g \\ s \\ s \\ -g \\ s \\ s \\ -g \\ -g$	49% 85% 56% 98% 90% 47% 43% 50% 55% 83% 55%	$\begin{array}{c c} 40\% \\ 44\% \\ 40\% \\ \hline \\ 100 \\ 2-g \\ 5 \\ 74\% \\ 5 \\ 6 \\ 6 \\ 6 \\ 6 \\ 75 \\ 6 \\ 6 \\ 79\% \\ 5 \\ 79\% \\ 5 \\ 88\% \\ \end{array}$	56% 93% 58% ip sw_2-g 97% 50% 49% 56% 65% 55% 73% 85% 54%	89% 93% 58% ip sw_2_3-g 97% 50% 49% 50% 81% 73% 88%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	33% 98% 97% t w/ s sw 55% 65% 100% 46% 98% 100% 100% 100%	33% 40% 40% 40% tw/ 2-g 58% 86% 40% 44% 38% 44% 100% 44% 44% 44%	$\begin{array}{c c} 66\% \\ 95\% \\ 93\% \\ \hline \\ 8 \\ t \\ w_2 \\ 55\% \\ 55\% \\ 55\% \\ 47\% \\ 98\% \\ 47\% \\ 98\% \\ 80\% \\ 0 \\ 100\% \\ 47\% \\ 100\% \end{array}$	66% 95% 93% s t w/s g sw_2 3 55% 100% 98% 47% 95% 98% 47% 95% 98% 47% 000% 98% 47% 90%	49% 85% 56% 98% 90% 47% 43% 50% 55% 65% 83% 50% 92%	$\begin{array}{c c} 40\% \\ 44\% \\ 40\% \\ \hline \\ 40\% \\ \hline \\ 2 - g \\ 5 - 74\% \\ 5 - 60\% \\ 5 - 60\% \\ 5 - 44\% \\ 5 - 44\% \\ 5 - 40\% \\ 5 - 44\% \\ 5 - 88\% \\ 5 - 55\% \\ \end{array}$	$\begin{array}{c} 56\% \\ 93\% \\ 58\% \\ \hline \\ \mathbf{ip} \\ \mathbf{sw_2-g} \\ 97\% \\ 50\% \\ 49\% \\ 56\% \\ 65\% \\ 65\% \\ 65\% \\ 73\% \\ 85\% \\ 55\% \\ 92\% \end{array}$	$\begin{array}{c} 89\% \\ 93\% \\ 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2_3-g} \\ 97\% \\ 50\% \\ 49\% \\ 50\% \\ 81\% \\ 55\% \\ 73\% \\ 88\% \\ 54\% \\ 54\% \\ 92\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	33% 98% 97% t w/s sw 55% 65% 100% 47% 46% 98% 100% 100% 100% 98%	33% 40% 40% 40% 40% 2-gg 58% 86% 40% 44% 38% 44% 40% 47% 44% 37%	66% 95% 93% st tw/ sw_2 55% 55% 98% 47% 98% 80% 40% 0100% 41% 98% 80% 100% 83%	66% 95% 93% s t w/s sg sw_2_3 55% 100% 98% 47% 95% 98% 47% 98% 47% 98% 47% 98% 0 100% 83%	49% 85% 56% 98% 99% 47% 43% 50% 65% 83% 55% 83% 50% 92% 885%	40% 44% 40% 44% 40% p 2-g 5 74% 5 60% 5 60% 5 6 70% 5 5 5 5 6 79% 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 40% 5 5 5 5 5 5 5 5 5 5 5	56% 93% 58% ip sw_2-g 97% 50% 56% 55% 55% 55% 55% 55% 54% 92% 75%	$\begin{array}{c c} & 89\% \\ \hline & 93\% \\ \hline & 93\% \\ \hline & 58\% \\ \hline & ip \\ & $sw_2_3-g \\ 97\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 81\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 73\% \\ \hline & 88\% \\ \hline & 54\% \\ \hline & 92\% \\ \hline & 69\% \\ \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	$\begin{array}{c} 33\% \\ 98\% \\ 97\% \\ \hline \\ $97\% \\ $100\% \\ $100\% \\ $47\% \\ $46\% \\ $98\% \\ $100\% \\ $100\% \\ $47\% \\ $100\% \\ $98\% \\ $65\% \\ \hline \end{array}$	33% 40% 40% 40% 40% 2-g 58% 86% 40% 44% 38% 44% 44% 44% 37% 29%	$\begin{array}{c c} 66\% \\ \hline 95\% \\ 93\% \\ \hline s \\ t \\ \sqrt{sw_2} \\ 55\% \\ 55\% \\ 98\% \\ 47\% \\ 98\% \\ 47\% \\ 80\% \\ 80\% \\ 0 \\ 100\% \\ 47\% \\ 83\% \\ 84\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	49% 85% 56% ip -g sw 98% 90% 47% 43% 50% 55% 65% 83% 50% 92% 85% 85% 41%	$\begin{array}{c c} 40\% \\ \hline 40\% \\ \hline 44\% \\ 40\% \\ \hline 9 \\ \hline 9 \\ 5 \\ 74\% \\ 5 \\ 60\% \\ 5 \\ 44\% \\ 5 \\ 44\% \\ 5 \\ 44\% \\ 5 \\ 44\% \\ 5 \\ 88\% \\ 5 \\ 55\% \\ 5 \\ 38\% \\ 5 \\ 40\% \\ \end{array}$	$\begin{array}{c c} 56\% \\ \hline 93\% \\ \hline 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 97\% \\ 50\% \\ 49\% \\ 56\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 73\% \\ 85\% \\ 54\% \\ 92\% \\ 92\% \\ 92\% \\ 41\% \end{array}$	$\begin{array}{c c} 89\% \\ \hline 89\% \\ \hline 93\% \\ \hline 58\% \\ \hline 58\% \\ \hline 93\% \\ \hline 58\% \\ \hline 97\% \\ \hline 49\% \\ \hline 50\% \\ \hline 49\% \\ \hline 50\% \\ \hline 55\% \\ \hline 73\% \\ \hline 81\% \\ \hline 69\% \\ \hline 69\% \\ \hline 41\% \\ \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	$\begin{array}{c} 33\%\\ 98\%\\ 97\%\\ \hline \\ 97\%\\ \hline \\ 8\%\\ 55\%\\ 65\%\\ 65\%\\ 65\%\\ 47\%\\ 46\%\\ 98\%\\ 100\%\\ 100\%\\ 100\%\\ 47\%\\ 46\%\\ 98\%\\ 65\%\\ 81\%\\ \end{array}$	$\begin{array}{c} 33\% \\ 40\% \\ 40\% \\ \hline \\ 40\% \\ \hline \\ 10\% \\ \hline \\ 10\% \\ 40\% \\ \hline \\ 100\% \\ 44\% \\ 44\% \\ 44\% \\ 44\% \\ 44\% \\ 44\% \\ 40\% \\ 40\% \\ 40\% \\ \hline \\ 100\% \\ 47\% \\ \hline \\ 29\% \\ 60\% \\ \hline \\ 10\% \\ 10\% \\ \hline \\ 100\% \\ \hline \\ 10\% \\ 10$	$\begin{array}{c c} 66\% \\ 95\% \\ 93\% \\ \hline \\ 8 \\ \hline \\ 8 \\ \hline \\ 8 \\ \hline \\ 8 \\ - \\ 55\% \\ 55\% \\ 55\% \\ - \\ 55\% \\ 98\% \\ 47\% \\ 98\% \\ 47\% \\ 98\% \\ 80\% \\ - \\ 100\% \\ 83\% \\ 84\% \\ 64\% \end{array}$	$\begin{array}{c c} 66\% \\ \hline 95\% \\ \hline 93\% \\ \hline s \\ t \\ w/s \\ \hline g \\ sw_2 \\ 3 \\ \hline 55\% \\ \hline 100\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ 47\% \\ 50 \\ 100\% \\ 80\% \\ 47\% \\ 50 \\ 100\% \\ 83\% \\ 84\% \\ 64\% \\ \end{array}$	49% 85% 56% 98% 90% 43% 43% 55% 65% 83% 50% 55% 65% 83% 50% 92% 85% 75% 85%	40% 44% 40% 40% ip 2-g 5 74% 60% 5 40% 40% 5 44% 40% 5 44% 5 44% 5 44% 5 44% 5 5 44% 5 5 38% 5 33%	$\begin{array}{c} 56\% \\ 93\% \\ 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 97\% \\ 50\% \\ 49\% \\ 56\% \\ 65\% \\ 65\% \\ 65\% \\ 73\% \\ 85\% \\ 85\% \\ 92\% \\ 75\% \\ 75\% \\ 41\% \\ 63\% \end{array}$	$\begin{array}{c c} & 89\% \\ \hline & 89\% \\ \hline & 93\% \\ \hline & 58\% \\ \hline & ip \\ & sw_2_3-g \\ & 97\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 49\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 51\% \\ \hline & 73\% \\ \hline & 88\% \\ \hline & 88\% \\ \hline & 54\% \\ \hline & 92\% \\ \hline & 69\% \\ \hline & 41\% \\ \hline & 83\% \\ \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	$\begin{array}{c} 33\% \\ 98\% \\ 97\% \\ t \ w/ \ s \\ sw \\ 55\% \\ 65\% \\ 100\% \\ 47\% \\ 46\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 98\% \\ 65\% \\ 81\% \\ 81\% \end{array}$	$\begin{array}{c} 33\% \\ 40\% \\ 40\% \\ \hline \\ 40\% \\ \hline \\ 10\% \\ \hline \\ 10\% \\$	$\begin{array}{c c} 66\% \\ \hline 95\% \\ 93\% \\ \hline 93\% \\ \hline s \\ t \\ sw_2 \\ \hline 55\% \\ 55\% \\ 55\% \\ 47\% \\ 98\% \\ 47\% \\ 98\% \\ 47\% \\ 98\% \\ 80\% \\ \hline 100\% \\ 47\% \\ 83\% \\ 84\% \\ 64\% \\ 93\% \\ \end{array}$	$\begin{array}{c c} 66\% \\ \hline 95\% \\ \hline 93\% \\ \hline s \\ t \\ w/s \\ \hline s \\ c \\$	49% 85% 56% 98% 98% 90% 43% 43% 50% 55% 83% 55% 83% 50% 55% 83% 44% 44% 44% 55% 84% 50% 50% 50% 50% 50% 50% 50% 50	40% 44% 40% 44% 40% ip 2-g 74% 60% 44% 40% 44% 44% 44% 44% 44% 44% 537% 337% 337%	$\begin{array}{c} 56\% \\ 93\% \\ 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 97\% \\ 50\% \\ 50\% \\ 55\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 85\% \\ 73\% \\ 85\% \\ 92\% \\ 75\% \\ 41\% \\ 41\% \\ 63\% \\ 40\% \end{array}$	$\begin{array}{c c} & 89\% \\ \hline & 89\% \\ \hline & 93\% \\ \hline & 58\% \\ \hline & ip \\ sw_2_3-g \\ 97\% \\ \hline & 50\% \\ 49\% \\ \hline & 50\% \\ 81\% \\ \hline & 49\% \\ \hline & 50\% \\ \hline & 55\% \\ \hline & 73\% \\ \hline & 88\% \\ \hline & 54\% \\ \hline & 54\% \\ \hline & 54\% \\ \hline & 69\% \\ \hline & 41\% \\ \hline & 40\% \\ \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	$\begin{array}{c} 33\% \\ 98\% \\ 97\% \\ \hline \\ $97\% \\ $100\% \\ $100\% \\ $47\% \\ $46\% \\ $100\% \\ $100\% \\ $100\% \\ $100\% \\ $100\% \\ $100\% \\ $100\% \\ $81\% \\ $98\% \\ $65\% \\ $81\% \\ $94\% \\ $98\% \\ $98\% \\ $100\% \\ 10	33% 40% 40% 40% 10% 58% 86% 40% 44% 38% 44% 38% 44% 38% 44% 38% 44% 38% 40% 100% 47% 40% 37% 29% 40% 38%	66% 95% 93% st tw/ sw_2 55% 55% 98% 947% 98% 97% 98% 97% 98% 97% 98% 97% 98% 97% 98% 80% 100% 80% 100% 83% 84% 93% 64% 93% 63%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	49% 85% 56% 98% 90% 47% 43% 50% 55% 65% 83% 50% 92% 85% 41% 75% 85% 45% 85% 85% 85% 85% 85%	40% 44% 40% 44% 40% 1 2-g 5 74% 5 60% 5 60% 5 6 70% 5 5 5 5 6 79% 5 5 5 6 79% 5 5 6 79% 5 5 6 79% 5 5 6 6 79% 5 6 70% 6 70% 70%	56% 93% 58% ip sw_2-g 97% 50% 56% 55% 55% 73% 85% 92% 75% 41% 63% 40% 88%	$\begin{array}{c c} & 89\% \\ \hline & 89\% \\ \hline & 93\% \\ \hline & 58\% \\ \hline & ip \\ & 58\% \\ \hline & 97\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 81\% \\ \hline & 55\% \\ \hline & 69\% \\ \hline & 41\% \\ \hline & 83\% \\ \hline & 83\% \\ \hline & 40\% \\ \hline & 93\% \\ \hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah	$\begin{array}{c} 33\% \\ 98\% \\ 97\% \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \$	33% 40% 40% 40% 40% 10% 58% 86% 40% 44% 38% 44% 37% 29% 40% 76% 38% 75% 44%	$\begin{array}{c c} 66\% \\ \hline 95\% \\ 93\% \\ \hline 95\% \\ 55\% \\ 55\% \\ 98\% \\ 47\% \\ 98\% \\ 47\% \\ 98\% \\ 47\% \\ 98\% \\ 68\% \\ 100\% \\ 47\% \\ 68\% \\ 60\% \\ 100\% \\ 63\% \\ 93\% \\ 63\% \\ 90\% \\ 73\% \\ 100\% \\ \hline 00\% \\ 100\% \\ \hline 0100\% \\ \hline 010$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	49% 85% 56% ip -g sw 98% 90% 90% 90% 43% 50% 55% 65% 83% 50% 92% 85% 41% 75% 85% 63% 66% 37%	40% 44% 40% 44% 40% ip ip 2-g 5 74% 6 37% 44% 44% 44% 44% 5 44% 5 44% 5 44% 5 5 44% 5 5 6 40% 5 33% 5 5 40% 5 5 6 37% 5 5 47% 5	$\begin{array}{c c} 56\% \\ \hline 93\% \\ \hline 58\% \\ \hline \\ $\mathbf{y}_2-\mathbf{g}$ \\ 97\% \\ \hline 50\% \\ \hline 50\% \\ \hline 50\% \\ \hline 55\% \\ \hline 55\% \\ \hline 73\% \\ \hline 85\% \\ \hline 73\% \\ \hline 85\% \\ \hline 73\% \\ \hline 65\% \\ \hline 65\% \\ \hline 65\% \\ \hline 65\% \\ \hline 73\% \\ \hline 88\% \\ \hline 73\% \\ \hline 40\% \\ \hline 88\% \\ \hline 79\% \\ \hline 60\% \\ \hline 93\% \\ \end{array}$	$\begin{array}{c c} & 89\% \\ \hline & 89\% \\ \hline & 93\% \\ \hline & 93\% \\ \hline & 58\% \\ \hline & 1000 $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah	$\begin{array}{c} 33\% \\ 98\% \\ 97\% \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \$	33% 40% 40% 40% 40% 40% 58% 86% 40% 38% 44% 38% 44% 38% 44% 38% 44% 38% 40% 76% 38% 75% 44% 52% 100%	$\begin{array}{c c} 66\% \\ \hline 95\% \\ 93\% \\ \hline 91\% \\ \hline 95\% \\ 93\% \\ \hline 95\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ 64\% \\ 100\% \\ 64\% \\ 93\% \\ 64\% \\ 90\% \\ 73\% \\ 100\% \\ \hline 00\% \\ 0 100\% \\ \hline 00\% \\ 0 100\% \\ \hline 0 10\% \\ 0 10\% \\ \hline 0 10\% \\ $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	49% 85% 56% ip -g sw 98% 90% 47% 43% 50% 55% 65% 83% 50% 92% 85% 41% 75% 85% 41% 75% 63% 60% 37% 47%	$\begin{array}{c c} 40\% \\ \hline 40\% \\ \hline 40\% \\ \hline 10\% \\ \hline 2-g \\ 5 & 74\% \\ \hline 5 & 60\% \\ 5 & 44\% \\ 5 & 46\% \\ 5 & 44\% \\ 5 & 46\% \\ 5 & 44\% \\ 5 & 44\% \\ 5 & 55\% \\ 5 & 55\% \\ 5 & 38\% \\ 5 & 55\% \\ 5 & 55\% \\ 5 & 55\% \\ 5 & 37\% \\ 5 & 55\% \\ 5 & 47\% \\ 5 & 55\% \\ 5 & 47\% \\ 5 & 56\% \\ 5 & 57\%$	56% 93% 58% ip sw_2-g 97% 50% 56% 55% 55% 73% 85% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 93% 81%	$\begin{array}{c c} & 89\% \\ \hline & 89\% \\ \hline & 93\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 100 \\ & 50\% \\ \hline & 50\% \\ \hline & 49\% \\ \hline & 50\% \\ \hline & 49\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 73\% \\ \hline & 88\% \\ \hline & 54\% \\ \hline & 55\% \\ \hline & 69\% \\ \hline & 41\% \\ \hline & 83\% \\ \hline & 40\% \\ \hline & 93\% \\ \hline & 79\% \\ \hline & 60\% \\ \hline & 60\% \\ \hline & 60\% \\ \hline & 60\% \\ \hline & 83\% \\ \hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya	$\begin{array}{c} 33\%\\ 98\%\\ 97\%\\ \hline \\ 97\%\\ \hline \\ 97\%\\ \hline \\ 8\%\\ 55\%\\ 65\%\\ 65\%\\ 65\%\\ 65\%\\ 47\%\\ 46\%\\ 98\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 98\%\\ 65\%\\ 81\%\\ 94\%\\ 98\%\\ 90\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ \end{array}$	33% 40% 40% 40% 40% 40% 40% 58% 86% 40% 44% 40% 44% 37% 29% 40% 76% 38% 44% 52% 100% 100%	$\begin{array}{c c} 66\% \\ 95\% \\ 93\% \\ \hline \\ 93\% \\ \hline \\ 8 \\ \hline \\ 8 \\ \hline \\ 8 \\ - \\ 55\% \\ - \\ 55\% \\ - \\ 55\% \\ - \\ 55\% \\ - \\ 98\% \\ - \\ 98\% \\ - \\ 98\% \\ - \\ 98\% \\ - \\ 98\% \\ - \\ 100\% \\ - \\ 84\% \\ - \\ 64\% \\ - \\ 93\% \\ - \\ 64\% \\ - \\ 93\% \\ - \\ 64\% \\ - \\ 93\% \\ - \\ 100\% \\ - \\ 10\% \\ - \\ 1$	$\begin{array}{c c} 66\% \\ \hline 95\% \\ \hline 93\% \\ \hline s \\ t \\ w/s \\ \hline g \\ sw_2 \\ 3 \\ \hline 55\% \\ \hline 100\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ 60\% \\ 6100\% \\ 83\% \\ 84\% \\ 64\% \\ 93\% \\ 66\% \\ 73\% \\ \hline 0100\% \\ 86\% \\ 73\% \\ \hline 0100\% \\ 6100\% \\ \hline 000\% \\ \hline 00\% \hline 00\% \hline 00\% \\ \hline 00\% $	49% 85% 56% 90% 90% 47% 43% 50% 50% 43% 65% 83% 50% 92% 85% 65% 83% 50% 50% 92% 85% 63% 92% 44% 85% 63% 63% 63% 63% 63% 63% 63% 63	40% 44% 40% 44% 40% 40% 40% 578 574% 578% 578% 578% 578% 578% 578% 578% 578	$\begin{array}{c} 56\% \\ 93\% \\ 58\% \\ \hline \\ 8w_2-g \\ 97\% \\ 50\% \\ 49\% \\ 56\% \\ 65\% \\ 65\% \\ 65\% \\ 73\% \\ 85\% \\ 85\% \\ 73\% \\ 85\% \\ 41\% \\ 63\% \\ 40\% \\ 88\% \\ 88\% \\ 88\% \\ 81\% \\ 60\% \\ 81\% \\ 60\% \end{array}$	$\begin{array}{c} 89\% \\ 93\% \\ 93\% \\ 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2_3-g} \\ 97\% \\ 50\% \\ 49\% \\ 50\% \\ 81\% \\ 55\% \\ 73\% \\ 88\% \\ 88\% \\ 92\% \\ 69\% \\ 41\% \\ 83\% \\ 40\% \\ 93\% \\ 79\% \\ 60\% \\ 83\% \\ 60\% \\ 60\% \end{array}$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c} 33\%\\ 98\%\\ 97\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 98\%\\ 100\%\\ 100\%\\ 98\%\\ 98\%\\ 90\%\\ 100\%\\ 97\%\\ 88\%\\ 90\%\\ 100\%$	33% 40% 40% 40% 40% 40% 40% 40% 58% 86% 40% 44% 40% 44% 40% 44% 37% 29% 40% 76% 38% 44% 75% 44% 52% 100% 100% 47% 90% 37% 60% 58% 71% 60% 58% 71%	$\begin{array}{c c} 66\% \\ 95\% \\ 95\% \\ 93\% \\ \hline \\ 8 \\ 8$	$\begin{array}{c c} 66\% \\ \hline 95\% \\ \hline 93\% \\ \hline s \\ t \\ w/s \\ \hline g \\ sw_2 \\ 3 \\ \hline 55\% \\ \hline 100\% \\ 98\% \\ \hline 47\% \\ 95\% \\ 98\% \\ \hline 47\% \\ 6 \\ 100\% \\ \hline 88\% \\ \hline 64\% \\ 93\% \\ \hline 64\% \\ 93\% \\ \hline 64\% \\ 93\% \\ \hline 660\% \\ \hline 0100\% \\ \hline 88\% \\ \hline 66\% \\ \hline 73\% \\ \hline 0100\% \\ \hline 88\% \\ \hline 60\% \\ \hline 73\% \\ \hline 0100\% \\ \hline 88\% \\ \hline 60\% \\ \hline 73\% \\ \hline 71\% \\ \hline 71\% \\ \hline 71\% \\ \hline \end{array}$	49% 85% 56% 98% 90% 43% 43% 43% 43% 43% 43% 43% 43	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 56\% \\ 93\% \\ 58\% \\ \hline 8w_2-g \\ 97\% \\ 50\% \\ 49\% \\ 56\% \\ 65\% \\ 65\% \\ 65\% \\ 73\% \\ 85\% \\ 73\% \\ 85\% \\ 75\% \\ 74\% \\ 92\% \\ 75\% \\ 41\% \\ 66\% \\ 66\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 75\% \\ 77\% \\ 79\% \\ 55\% \\ 69\% \\ 55\% \end{array}$	$\begin{array}{c} 89\% \\ 93\% \\ 93\% \\ 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2_3-g} \\ 97\% \\ 50\% \\ 49\% \\ 50\% \\ 81\% \\ 55\% \\ 73\% \\ 88\% \\ 88\% \\ 92\% \\ 69\% \\ 41\% \\ 83\% \\ 40\% \\ 93\% \\ 93\% \\ 93\% \\ 60\% \\ 47\% \\ 83\% \\ 60\% \\ 55\% \\ 83\% \\ 83\% \\ 60\% \\ 55\% \\ 83\% \\ 77\% \\ 81\% \\ 50\% \\ 71\% \\ 58\% \\ \end{array}$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jama Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c} 33\%\\ 98\%\\ 97\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 100\%\\ 98\%\\ 100\%\\ 100\%\\ 98\%\\ 98\%\\ 90\%\\ 100\%\\ 97\%\\ 88\%\\ 90\%\\ 100\%$	33% 40% 40% 40% 40% 40% 40% 40% 58% 86% 40% 44% 40% 44% 40% 44% 37% 29% 40% 76% 38% 44% 75% 44% 52% 100% 100% 47% 90% 37% 60% 58% 71% 60% 58% 71%	$\begin{array}{c c} 66\% \\ 95\% \\ 95\% \\ 93\% \\ \hline \\ 8 \\ 8$	$\begin{array}{c c} 66\% \\ 95\% \\ 93\% \\ \hline s t w/s \\ 93\% \\ \hline s \\ 100\% \\ 93\% \\ \hline s \\ 100\% \\ 93\% \\ \hline s \\ 93\% \\ 98\% \\ 47\% \\ 95\% \\ 98\% \\ 47\% \\ 98\% \\ 80\% \\ 0 \\ 100\% \\ 88\% \\ 64\% \\ 93\% \\ 66\% \\ 66\% \\ 66\% \\ 0 \\ 100\% \\ 88\% \\ 97\% \\ 85\% \\ 60\% \\ 0 \\ 100\% \\ 73\% \\ 60\% \\ 100\% \\ 73\% \\ 60\% \\ 100\% \\ 73\% \\ 60\% \\ 100\% \\ 73\% \\ 60\% \\ 100\% \\ 73\% \\ 60\% \\ 100\% \\ 73\% \\ 60\% \\ 100\% \\ 73\% \\ 60\% \\ 100\% \\ 73\% \\ 71\% \\ 62\% \\ 71\% \\ 62\% \\ 85\% \\ 60\% \\ 71\% \\ 62\% \\ 71\% \\ 62\% \\ 71\% \\ 62\% \\ 71\% \\ 62\% \\ 71\% \\ 62\% \\ 71\% \\ 71\% \\ 62\% \\ 71\% \\ 71\% \\ 62\% \\ 73\% \\ 71\% \\ 62\% \\ 71\% \\ 71\% \\ 71\% \\ 62\% \\ 71\%$	49% 85% 56% 98% 90% 43% 43% 43% 55% 65% 83% 50% 92% 85% 65% 83% 63% 63% 63% 63% 63% 63% 55% 63% 63% 55% 63% 55% 63% 63% 55% 63% 55% 63% 65% 63% 55% 63% 63% 55% 63% 63% 55% 63% 63% 63% 55% 63% 63% 63% 63% 63% 63% 63% 63	$\begin{array}{c c} 40\% \\ \hline 40\% \\ \hline 40\% \\ \hline 40\% \\ \hline 90\% \hline 9$	$\begin{array}{c} 56\% \\ 93\% \\ 58\% \\ \hline 8w_2-g \\ 97\% \\ 50\% \\ 49\% \\ 56\% \\ 65\% \\ 65\% \\ 65\% \\ 73\% \\ 85\% \\ 73\% \\ 85\% \\ 75\% \\ 74\% \\ 92\% \\ 75\% \\ 41\% \\ 66\% \\ 66\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 75\% \\ 77\% \\ 79\% \\ 55\% \\ 69\% \\ 55\% \end{array}$	$\begin{array}{c} 89\% \\ 93\% \\ 93\% \\ 58\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2_3-g} \\ 97\% \\ 50\% \\ 49\% \\ 50\% \\ 81\% \\ 55\% \\ 73\% \\ 88\% \\ 92\% \\ 69\% \\ 41\% \\ 88\% \\ 40\% \\ 92\% \\ 69\% \\ 41\% \\ 83\% \\ 40\% \\ 54\% \\ 83\% \\ 60\% \\ 47\% \\ 83\% \\ 60\% \\ 55\% \\ 83\% \\ 83\% \\ 77\% \\ 81\% \\ 50\% \\ 71\% \\ 58\% \\ \end{array}$

Table C.10: Per level and query weighted recall when using MBHA benchmarks for Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	57%	52%	57%	58%	80%	63%	62%	62%
Adnan Ibrahim	88%	72%	88%	68%	98%	60%	60%	60%
Amman	85%	53%	85%	85%	57%	55%	93%	93%
Jarrar	73%	57%	57%	57%	80%	53%	57%	57%
Alishaa'	80%	50%	83%	83%	63%	53%	57%	57%
Nahawnd	70%	55%	57%	57%	95%	55%	95%	95%
Qersh	88%	52%	60%	60%	95%	57%	87%	87%
Asia	87%	55%	70%	67%	95%	57%	95%	93%
Shir (Shi3r)	55%	57%	57%	57%	58%	53%	58%	58%
Arafat	88%	60%	92%	87%	70%	53%	77%	77%
Cameron	75%	55%	68%	68%	62%	55%	62%	62%
Maliki	54%	37%	60%	60%	70%	42%	62%	62%
Bagara	63%	55%	58%	58%	83%	55%	58%	58%
Sakhr	52%	53%	51%	51%	93%	76%	93%	60%
Iqteran	50%	50%	50%	50%	55%	55%	62%	98%
Aziz	78%	75%	83%	83%	72%	83%	83%	83%
Ahram	75%	50%	77%	77%	67%	53%	95%	95%
Jalamah	77%	60%	68%	68%	88%	60%	85%	85%
Malek Abdullah	92%	62%	85%	85%	100%	100%	100%	100%
Jamaa Arabiya	60%	92%	95%	98%	92%	92%	58%	95%
Sakakini	55%	55%	55%	55%	98%	58%	98%	98%
Bursa	78%	82%	80%	78%	100%	93%	98%	98%
Ain	58%	53%	57%	57%	78%	55%	82%	82%
Thaheryah	73%	53%	73%	73%	90%	65%	65%	65%
Tarablus	80%	50%	80%	72%	85%	58%	88%	88%
Azhar	77%	58%	77%	77%	87%	60%	77%	77%
Arabiyah	73%	55%	73%	57%	68%	55%	63%	63%
		4107	69%	69%	60%	47%	63%	89%
Asad	42%	41%	0970	0970	0070	41/0	0370	0070
Asad Athraa'	42% 98%	41% 53%	95%	95%	85%	55%	93%	93%
Athraa' Qedra	98%	53% 53% t w/	95% 93% s tw/	95% 93% s t w/ s	85% 60% ip	55% 53% ip	93% 63% ip	93% 63% ip
Athraa'	98% 97%	53% 53%	95% 93% s t w/ sw_2-	95% 93% s t w/ s g sw_2_3	85% 60%	55% 53% ip	93% 63% ip sw_2-g	93% 63% ip sw_2_3-g
Athraa' Qedra Dataset (Query) Amazon	98% 97% t w/ s sw 62%	53% 53% t w/ 2-g 63%	95% 93% s t w/ sw_2- 62%	95% 93% s t w/ s ⋅g sw_2_3 62%	85% 60% ip -g sv 989	55% 53% ip 2-g 75%	93% 63% ip sw_2-g 97%	93% 63% ip sw_2_3-a 97%
Athraa' Qedra Dataset (Query)	98% 97% t w/ s sw	53% 53% t w/ 2-g	95% 93% s t w/ sw_2-	95% 93% s t w/ s g sw_2_3	85% 60% ip -g sv	55% 53% ip 2-g 75%	93% 63% ip sw_2-g	93% 63% ip sw_2_3-g
Athraa' Qedra Dataset (Query) Amazon	98% 97% t w/ s sw 62% 68% 100%	53% 53% 53% tw/ 2-g 63% 87% 53%	95% 93% s t w/ sw_2- 62% 62% 98%	95% 93% s t w/ s g sw_2_3 62% 100% 98%	85% 60% -g sw 989 909 529	55% 53% ip 2-g 7 75% 75% 75% 75% 75% 75% 52%	93% 63% ip sw_2-g 97% 58% 53%	93% 63% ip sw_2_3- 97% 58% 53%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	98% 97% t w/ s sw 62% 68%	53% 53% 53% t w/ 2-g 63% 87%	95% 93% s t w/ sw_2- 62% 62%	95% 93% s t w/ s g sw_2_3 62% 100%	85% 60% -g sw 989 909	55% 53% ip 2-g 7 75% 75% 75% 75% 75% 75% 52%	93% 63% ip sw_2-g 97% 58%	93% 63% ip sw_2_3- 97% 58%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	98% 97% t w/ s sw 62% 68% 100%	53% 53% 53% tw/ 2-g 63% 87% 53%	95% 93% s t w/ sw_2- 62% 62% 98%	95% 93% s t w/ s g sw_2_3 62% 100% 98%	85% 60% -g sw 989 909 529	55% 53% ip 2-g 7 75% 65% 75% 52% 755%	93% 63% ip sw_2-g 97% 58% 53%	93% 63% ip sw_2_3- 97% 58% 53%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	98% 97% t w/ s sw 62% 68% 100% 57%	53% 53% 53% t w/ 2-g 63% 87% 53%	95% 93% s t w/ sw_2- 62% 62% 98% 57%	95% 93% s t w/ s g sw_2_3 62% 100% 98% 57%	85% 60% -g sv 989 909 529 539	55% 53% • ip v 2-g % 75% % 65% % 52% % 55% % 55%	93% 63% ip sw_2-g 97% 58% 53% 62%	93% 63% ip sw_2_3- 97% 58% 53% 58%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	98% 97% t w/ s 62% 68% 100% 57% 55%	53% 53% t w/ 2-g 63% 87% 53% 55% 50%	95% 93% s t w/ sw_2- 62% 62% 98% 57% 95%	95% 93% s t w/ s g sw_2_3 62% 100% 98% 57% 95%	85% 60% • ip -g sv 985 905 525 535 585	55% 53% 53% y y 2-g % 75% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55%	93% 63% ip sw_2-g 97% 58% 53% 62% 68%	93% 63% ip sw_2_3- 97% 58% 53% 58% 82%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	98% 97% t w/ s 62% 68% 100% 57% 55% 98%	53% 53% t w/ 2-g 63% 87% 53% 55% 50% 55%	95% 93% s t w/ sw_2- 62% 98% 57% 95% 98% 80%	$\begin{array}{c} 95\% \\ 93\% \\ \hline 93\% \\ s & t w/s \\ g & sw_2_3 \\ \hline 62\% \\ 100\% \\ 98\% \\ 57\% \\ 95\% \\ 98\% \\ 80\% \end{array}$	85% 60% -g sw 985 905 525 535 585 625	55% 53% 53% 53% 2-g % 75% % 52% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 53%	93% 63% ip sw_2-g 97% 58% 53% 62% 68% 62%	$\begin{array}{c c} 93\% \\\hline 63\% \\\hline \mathbf{ip} \\\mathbf{sw}_2_3-t} \\97\% \\\hline 58\% \\\hline 53\% \\\hline 58\% \\\hline 58\% \\\hline 82\% \\\hline 62\% \\\hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	98% 97% t w/ s sw 62% 68% 100% 55% 98% 100% 100%	53% 53% 53% t w/ 2-g 63% 87% 53% 55% 50% 55% 50% 53% 100%	95% 93% s t w/ sw_2 62% 62% 98% 57% 95% 95% 95% 98% 80% 0100% 100%	95% 93% s t w/s g sw_2_3 62% 100% 98% 95% 95% 95% 80%	85% 60% -g sw 98% 90% 52% 53% 62% 62% 68% 83%	55% 53% 53% 53% 53% 7 2-g % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 53% % 53% % 53% % 53% % 53% % 53% % 53% % 80%	93% 63% ip sw_2-g 97% 58% 53% 62% 62% 75% 85%	93% 63% ip 97% 58% 53% 58% 82% 62% 62% 88%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	98% 97% t w/ s sw 62% 68% 100% 55% 98% 100%	53% 53% 53% t w/ 2-g 63% 87% 53% 55% 50% 55% 53%	95% 93% s t w/ sw_2- 62% 98% 57% 95% 98% 80%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ 98\% \\ \hline 95\% \\ 95\% \\ 95\% \\ 80\% \\ \hline 100\% \\ 55\% \\ \end{array}$	85% 60% -g sw 985 905 525 535 535 585 625 685	55% 53% 53% ip z 2-g % 75% % 52% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55%	93% 63% ip sw_2-g 97% 58% 53% 62% 62% 62% 75%	93% 63% ip 97% 58% 58% 53% 58% 82% 62% 75%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	98% 97% t w/s sw 62% 68% 100% 55% 98% 100% 55%	53% 53% 53% t w/ 2-g 63% 87% 53% 55% 55% 53% 100% 57%	95% 93% s t w/ sw_2- 62% 62% 98% 95% 98% 95% 98% 57% 98% 55% 100% 55%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2 \\ \hline 360\% \\ \hline 100\% \\ \hline 98\% \\ 57\% \\ 95\% \\ 98\% \\ 80\% \\ \hline 100\% \\ \hline 55\% \\ 100\% \end{array}$	85% 60% -g sv 985 525 535 525 535 525 535 525 535 525 535 525 535 53	55% 53% 53% ip z 2-g % 75% % 65% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 80% % 80% % 88%	$\begin{array}{c c} 93\% \\ \hline 63\% \\ \hline \mathbf{ip} \\ \mathbf{sw}_2\mathbf{.g} \\ 97\% \\ 58\% \\ 53\% \\ 62\% \\ 68\% \\ 62\% \\ 68\% \\ 62\% \\ 85\% \\ 60\% \end{array}$	93% 63% ip 97% 58% 53% 58% 82% 62% 62% 88% 60%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	98% 97% t w/ s sw 62% 68% 100% 55% 98% 100% 100% 55% 100%	53% 53% 53% 53% 2-g 63% 87% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55%	95% 93% s t w/ sw_2 62% 62% 98% 577% 98% 98% 80% 100% 55%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ 98\% \\ \hline 95\% \\ 95\% \\ 95\% \\ 80\% \\ \hline 100\% \\ 55\% \\ \end{array}$	85% 60% -g sw 985 535 535 622 685 622 685 685 835	55% 53% 53% ip z 2-g % 75% % 52% % 55% % 55% % 55% % 53% % 55% % 55% % 55% % 55% % 55% % 55% % 80% % 88% % 82% % 62%	93% 63% ip sw_2-g 97% 58% 62% 68% 62% 68% 62% 68% 60% 92%	$\begin{array}{c c} 93\% \\\hline 63\% \\\hline \mathbf{ip} \\\mathbf{sw_2} & \mathbf{3-} \\7\% \\\hline 58\% \\\hline 58\% \\\hline 58\% \\\hline 62\% \\\hline 62\% \\\hline 75\% \\\hline 88\% \\\hline 60\% \\\hline 92\% \\\hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	98% 97% t w/ s 62% 68% 100% 55% 98% 100% 100% 55% 100% 68%	53% 53% 53% t w/ 2-g 63% 53% 53% 55% 55% 55% 55% 52% 39%	95% 93% s t w/ 62% 62% 98% 57% 95% 98% 55% 95% 98% 100% 83% 84%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ 98\% \\ 98\% \\ 98\% \\ 95\% \\ 98\% \\ 80\% \\ 80\% \\ 100\% \\ 55\% \\ 100\% \\ 83\% \\ 84\% \\ \end{array}$	85% 60% 98% 900 522 533 58% 622 68% 833 58% 92% 855%	55% 53% 53% 53% 53% 75% 65% 52% 55% 62% 62% 62%	93% 63% ip sw_2-g 97% 58% 62% 62% 62% 60% 92% 92% 92% 92% 92% 93%	93% 63% 97% 58% 53% 58% 62% 62% 62% 62% 62% 62% 75% 88% 60% 72% 49%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	98% 97% t w/ s sw 62% 68% 100% 55% 98% 100% 100% 55% 100% 88% 88%	53% 53% 53% t w/ 2-g 63% 55% 50% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 52% 39% 53%	95% 93% s t w/ 62% 62% 95%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ 98\% \\ \hline 98\% \\ 98\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ \hline 98\% \\ 80\% \\ \hline 100\% \\ 55\% \\ \hline 100\% \\ 83\% \\ \hline 84\% \\ 67\% \end{array}$	85% 60% •g swars 990 532 535 622 635 625 635 635 635 635 635 635 635 635 635 63	55% 53% 53% 7 2-g % 75% 65% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 55% % 62% % 62% % 62% % 53%	$\begin{array}{c c} 93\% \\ \hline & 63\% \\ \hline & \mathbf{ip} \\ \mathbf{sw_2-g} \\ 97\% \\ 58\% \\ 53\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 60\% \\ 92\% \\ 75\% \\ 75\% \\ 75\% \\ 77\% \\ 77\% \\ 77\% \\ 60\% \\ 92\% \\ 67\% \end{array}$	$\begin{array}{c c} 93\% \\\hline & 93\% \\\hline & 63\% \\\hline & \mathbf{ip} \\\hline & \mathbf{sw}_2 \ 3_{-1} \\\hline & 97\% \\\hline & 58\% \\\hline & 58\% \\\hline & 58\% \\\hline & 58\% \\\hline & 62\% \\\hline & 62\% \\\hline & 75\% \\\hline & 75\% \\\hline & 60\% \\\hline & 92\% \\\hline & 72\% \\\hline & 49\% \\\hline & 83\% \\\hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	98% 97% 57% 62% 68% 55% 55% 98% 100% 100% 100% 100% 98% 68% 82% 94%	53% 53% 53% t w/g 2-gg 63% 87% 53% 55% 55% 55% 55% 55% 55% 55% 55% 55% 52% 53% 53% 53% 52% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53%	95% 93% s t w/ sw_2 62% 62% 98% 95% 98% 95% 98% 80% 55% 100% 83% 84% 67% 93% 93%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s & t w/s \\ s \\ g & sw_2 \\ \hline 100\% \\ \hline 98\% \\ \hline 57\% \\ 98\% \\ \hline 80\% \\ \hline 100\% \\ \hline 83\% \\ \hline 84\% \\ \hline 67\% \\ \hline 93\% \\ \end{array}$	85% 60% ip -g sw 98% 90% 522 53% 62% 68% 62% 68% 68% 92% 88% 92% 88% 92% 77% 77% 75%	55% 53% 53% 53% 73% 2-gg 75% 65% 55% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62%	93% 63% ip sw_2-g 97% 53% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 60% 60% 60% 60% 67% 51%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 2_3 - y \\ 55\% \\ 55\% \\ 55\% \\ 62\% \\ 62\% \\ 75\% \\ 88\% \\ 60\% \\ 60\% \\ 92\% \\ 72\% \\ 49\% \\ 83\% \\ 51\% \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	98% 97% 57% 62% 68% 68% 55% 55% 100% 55% 100% 55% 100% 98% 68% 82% 98%	53% 53% 53% tw/ 2-g 63% 55%	$\begin{array}{c c} 95\%\\ \hline 93\%\\ \hline \\ \mathbf{s} tw/\\ $\mathbf{sw_22}$\\ $62\%\\ $-62\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-98\%\\ $-84\%\\ $-100\%\\ $-100\%\\ $-55\%\\ $-100\%\\ $-100\%\\ $-55\%\\ $-100\%\\ $-100\%\\ $-83\%\\ $-84\%\\ $-84\%\\ $-84\%\\ $-93\%\\ $-86\%\\ $-93\%\\ $-67\%\\ $-7\%\\ $	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ \hline 98\% \\ \hline 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ \hline 95\% \\ 98\% \\ 98\% \\ 80\% \\ \hline 100\% \\ \hline 55\% \\ \hline 83\% \\ 84\% \\ \hline 67\% \\ 93\% \\ \hline 65\% \end{array}$	85% 60% ip g swars 90% 52% 53% 58% 68% 83% 58% 92% 49% 77% 54% 85% 85% 85% 85% 85% 85% 85% 85	55% 53% 53% 53% 73% 65% 65% 75% 65% 55% 62% 44% 52%	93% 63% ip sw_2-g 97% 53% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 60% 92% 92% 77% 49% 67% 51% 88%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & \mathbf{ip} \\ 8\mathbf{w}_2_31 \\ 97\% \\ \hline 58\% \\ \hline 58\% \\ \hline 58\% \\ \hline 62\% \\ \hline 62\% \\ \hline 62\% \\ \hline 75\% \\ \hline 88\% \\ \hline 60\% \\ \hline 92\% \\ \hline 72\% \\ \hline 49\% \\ \hline 83\% \\ \hline 51\% \\ 93\% \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz	98% 97% sw 62% 68% 100% 55% 98% 100% 55% 100% 55% 98% 94% 94% 98% 90%	53% 53% 53% 53% 2-5g 63% 87% 53% 55% 50% 55% 53% 53% 50% 70% 70%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline $ 62\% \\ \hline $ 62\% \\ \hline $ 62\% \\ \hline $ 98\% \\ \hline $ 98\% \\ \hline $ 95\% \\ \hline $ 98\% \\ \hline $ 95\% \\ \hline $ 98\% \\ \hline $ 98\% \\ \hline $ 98\% \\ \hline $ 55\% \\ \hline $ 100\% \\ \hline $ 80\% \\ \hline $ 80\% \\ \hline $ 80\% \\ \hline $ 67\% \\ \hline $ 93\% \\ \hline $ 67\% \\ \hline $ 90\% \\ \hline $ 90\% \\ \hline \end{tabular}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ 98\% \\ 98\% \\ 98\% \\ 95\% \\ 98\% \\ 80\% \\ \hline 55\% \\ 100\% \\ \hline 55\% \\ 100\% \\ \hline 83\% \\ 84\% \\ \hline 67\% \\ 93\% \\ \hline 65\% \\ 87\% \end{array}$	85% 60% ip 98% 99% 53% 52% 62% 62% 68% 68% 83% 58% 992% 85% 68% 992% 77% 54% 86% 66%	55% 53% 53% 53% 7 2-gg 75% 65% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 62% 62% 64% 55% 55% 55% 55% 55% 55% 62% 62% 62% 63% 63%	93% 63% ip sw_2-g 97% 58% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 62% 60% 92% 97% 49% 67% 51% 88% 80%	93% 63% ip sw_2_3-; 97% 58% 82% 62% 75% 88% 60% 92% 93% 83% 51% 93% 80%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram	98% 97% t w/ s sw 62% 68% 100% 55% 98% 100% 55% 98% 68% 82% 94% 98% 90% 100%	53% 53% 53% 53% 2-gg 63% 87% 55% 55%	95% 93% s t w/ 62% 62% 95% 100% 55% 100% 67% 90% 90%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ 98\% \\ \hline 98\% \\ 98\% \\ 95\% \\ 98\% \\ 80\% \\ \hline 95\% \\ 98\% \\ 80\% \\ \hline 55\% \\ 100\% \\ 83\% \\ \hline 84\% \\ 67\% \\ 93\% \\ \hline 65\% \\ 87\% \\ 75\% \end{array}$	85% 60% ip g sware 90' 52' 53' 58' 62' 68' 83' 58' 92' 53' 84' 92' 54' 85' 67' 54' 67' 65'	55% 53% 53% 7 2-g 7	$\begin{array}{c c} 93\% \\ \hline & 63\% \\ \hline & sw_2-g \\ 97\% \\ 58\% \\ 53\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 75\% \\ 75\% \\ 75\% \\ 75\% \\ 75\% \\ 75\% \\ 85\% \\ 80\% $	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & $\mathbf{sw}_2 \ 3-} \\ 97\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 88\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 88\% \\ \hline & 60\% \\ \hline & 93\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah	98% 97% t w/ s 62% 68% 100% 55% 98% 100% 55% 100% 55% 100% 98% 68% 82% 94% 98% 90% 100% 97%	53% 53% 53% 53% 53% 63% 87% 53% 50% 53% 53% 50% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 50% 76% 55% 55%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline \\ 93\% \\ \hline \\ 8 \\ t \\ t \\ c \\ 62\% \\ - 62\% \\ - 62\% \\ - 98\% \\ - 98\% \\ - 98\% \\ - 98\% \\ - 95\% \\ - 99\% \\ - 100\% \\ - 55\% \\ - 100\% \\ - 55\% \\ - 100\% \\ - 67\% \\ - 93\% \\ - 67\% \\ - 90\% \\ - 75\% \\ - 75\% \\ - 100$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s & t w/s \\ sg & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ \hline 98\% \\ \hline 80\% \\ \hline 67\% \\ \hline 83\% \\ \hline 84\% \\ \hline 67\% \\ \hline 93\% \\ \hline 65\% \\ \hline 87\% \\ \hline 75\% \\ \hline 100\% \\ \hline \end{array}$	85% 60% ip -g swapped 985 900 522 533 585 625 685 685 835 585 925 533 585 685 585 544 925 544 855 544 855 544 855 647 655 652 525 525	55% 53% 53% 53% 73% 65% 65% 55% 55% 65% 55%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & sw_2-g \\ 97\% \\ \hline & 58\% \\ \hline & 53\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 77\% \\ \hline & 49\% \\ \hline & 67\% \\ \hline & 51\% \\ \hline & 88\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 93\% \\ \end{array}$	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 2_3 \\ 97\% \\ \hline 58\% \\ 58\% \\ 82\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 77\% \\ 88\% \\ 60\% \\ 60\% \\ 92\% \\ 72\% \\ 49\% \\ 83\% \\ 83\% \\ 83\% \\ 80\% \\ 65\% \\ 57\% \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah	98% 97% 57% 62% 68% 68% 55% 98% 100% 55% 98% 100% 55% 98% 98% 98% 98% 98% 90% 100%	53% 53% 53% 53% 63% 87% 53% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 53% 53% 53% 53% 55% 55% 50% 55% 50% 55% 50% 50% 50% 50% 50% 60% 100%	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s t w/ \\ sw_2 \\ \hline 62\% \\ 62\% \\ 98\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 0100\% \\ 55\% \\ 100\% \\ 83\% \\ 84\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 90\% \\ 75\% \\ 100\% \\ 00\% \\$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	85% 60% ip g swarp 900 522 68% 622 68% 92% 68% 92% 68% 92% 68% 92% 68% 92% 68% 92% 68% 92% 68% 92% 68% 92% 68% 92% 68% 92% 777 54% 85% 67% 66% 52% 57%	55% 53% 53% 53% 2-gg 75% 65% 55% 62% 46% 44% 52% 63% 57% 57%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & sw_2-g \\ 97\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 62\% \\ \hline & 65\% \\ \hline & 51\% \\ \hline & 88\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 93\% \\ \hline & 82\% \\ \end{array}$	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 3- \\ 97\% \\ \hline 58\% \\ 53\% \\ 58\% \\ \hline 62\% \\ 62\% \\ 62\% \\ 62\% \\ 75\% \\ 88\% \\ \hline 60\% \\ 60\% \\ 92\% \\ 92\% \\ 92\% \\ 92\% \\ 88\% \\ \hline 60\% \\ 65\% \\ 65\% \\ 83\% \\ \hline 83\% \\ \hline \end{array}$
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Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa	98% 97% 57% 58% 62% 68% 68% 100% 55% 55% 98% 100% 55% 100% 98% 68% 82% 94% 94% 90% 100% 100% 100% 100% 100% 100% 100%	$\begin{array}{c} 53\%\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{57\%}\\ \overline{55\%}\\ \overline{52\%}\\ \overline{55\%}\\ \overline{57\%}\\ \overline{55\%}\\ \overline{50\%}\\ \overline{57\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{57\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{57\%}\\ \overline{90\%}\\ \overline{90\%}\\ \overline{57\%}\\ \overline{50\%}\\ \overline{90\%}\\ \overline{50\%}\\ \overline{50\%}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s t w/ \\ sw_2 \\ \hline 62\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 995\% \\ 98\% \\ 80\% \\ \hline 55\% \\ 100\% \\ \hline 55\% \\ 100\% \\ 67\% \\ 93\% \\ 84\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 90\% \\ 75\% \\ 100\% \\ 90\% \\ 75\% \\ 90\% \\ 75\% \\ 97\% \\ 97\% \\ 97\% \end{array}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s & t w/s \\ s \\ g & sw_2_3 \\ \hline 62\% \\ \hline 100\% \\ \hline 98\% \\ \hline 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ \hline 95\% \\ 98\% \\ 98\% \\ \hline 95\% \\ 98\% \\ \hline 95\% \\ 98\% \\ \hline 95\% \\ 98\% \\ \hline 99\% \\ \hline 60\% \\ \hline 81\% \\ \hline 65\% \\ 83\% \\ \hline 84\% \\ \hline 65\% \\ \hline 87\% \\ \hline 75\% \\ \hline 100\% \\ \hline 100\% \\ \hline 100\% \\ \hline 88\% \\ 97\% \\ \hline \end{array}$	85% 60% ip	55% 53% 53% 53% 2-gg 75% 65% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 65% 62% 44% 52% 63% 57% 55% 57% 63% 57% 63% 57% 63% 57% 63% 55%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & sw_2-g \\ 97\% \\ \hline & 58\% \\ \hline & 53\% \\ \hline & 53\% \\ \hline & 62\% \\ \hline & 67\% \\ \hline & 49\% \\ \hline & 51\% \\ \hline & 88\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 93\% \\ \hline & 82\% \\ \hline & 65\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 77\% \\ \end{array}$	93% 63% ip sw_2_3- 97% 58% 53% 58% 62% 62% 60% 92% 72% 49% 83% 65% 57% 83% 62% 62% 62% 62% 62% 65% 65% 62% 62% 83% 62% 83% 62% 83%
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Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c c} 98\% \\ \hline 98\% \\ \hline 97\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c} 53\%\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{53\%}\\ \overline{55\%}\\ \overline{55\%}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s t w/ \\ \hline sw_2 \\ 62\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 100\% \\ 55\% \\ 100\% \\ 6100\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 90\% \\ 88\% \\ 65\% \\ 65\% \\ 65\% \\ 100\% \\ 910\% \\ 92\% \\ 88\% \\ 65\% \\ 100\% \\ $	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline 8 & t w/s \\ s & t w/s \\ \hline 100\% \\ \hline 88\% \\ \hline 98\% \\ \hline 99\% \\ \hline 80\% \\ \hline 100\% \\ \hline 88\% \\ \hline 97\% \\ \hline 88\% \\ \hline 97\% \\ \hline 88\% \\ \hline 97\% \\ \hline 85\% \\ \hline 65\% \\ \hline 65\% \\ \hline 100\% \\ \hline 00\% \hline 00\% \\ \hline 00\% \hline 00\% \\ \hline 00\% $	85% 60% ip	55% 53% 53% 53% 73% 2-gg 75% 65% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 80%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & sw_2-g \\ 97\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 62\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 92\% \\ \hline & 77\% \\ \hline & 49\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 65\% \\ \hline & 88\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 88\% \\ \hline & 80\% \\ \hline & 52\% \\ \hline \end{array}$	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 2 3 \\ 97\% \\ \hline & 58\% \\ \hline & 53\% \\ \hline & 58\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 72\% \\ \hline & 49\% \\ \hline & 83\% \\ \hline & 51\% \\ \hline & 93\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 57\% \\ \hline & 83\% \\ \hline & 65\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 78\% \\ \hline & 78\% \\ \hline & 82\% \\ \hline & 52\% \\ \hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	98% 97% 57% 52% 62% 68% 68% 100% 55% 98% 100% 100% 100% 98% 68% 68% 82% 94% 98% 90% 100% 97% 100% 100% 97% 88% 93%	$\begin{array}{c} 53\%\\ \overline{53\%}\\ \hline \\ 53\%\\ \hline \\ \hline \\ 100\%\\ \hline \\ 57\%\\ \hline \\ 90\%\\ \hline \\ 52\%\\ \hline \\ 100\%\\ \hline \\ 57\%\\ \hline \\ 90\%\\ \hline \\ 52\%\\ \hline \\ 100\%\\ \hline \\ 57\%\\ \hline \\ 90\%\\ \hline \\ 52\%\\ \hline \\ 100\%\\ \hline \\ 57\%\\ \hline \\ 90\%\\ \hline \\ 52\%\\ \hline \\ 100\%\\ \hline \\ 57\%\\ \hline \\ 90\%\\ \hline \\ 52\%\\ \hline \\ 100\%\\ \hline \\ 100\%$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s t w/ \\ \hline sw_2 \\ 62\% \\ 62\% \\ 98\% \\ 98\% \\ 95\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 65\% \\ 98\% \\ 62\% \\ 98\% \\ 67\% \\ 93\% \\ 67\% \\ 90\% \\ 67\% \\ 90\% \\ 100\% \\ 67\% \\ 90\% \\ 100\% \\ 67\% \\ 90\% \\ 65\% \\ 65\% \\ \end{array}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline 8 & t w/s \\ s & t w/s \\ s & t w/s \\ \hline 93\% \\ \hline 62\% \\ \hline 98\% \\ \hline 80\% \\ \hline 100\% \\ \hline 83\% \\ \hline 84\% \\ \hline 67\% \\ \hline 93\% \\ \hline 65\% \\ \hline 75\% \\ \hline 100\% \\ \hline 88\% \\ \hline 97\% \\ \hline 100\% \\ \hline 88\% \\ \hline 97\% \\ \hline 85\% \\ \hline 65\% \\ \hline 65\% \\ \hline 87\% \\ \hline 65\% \\ \hline 87\% \\ \hline 55\% \\ \hline 65\% \\ \hline 87\% \\ \hline 65\% \\ \hline 65\% \\ \hline 87\% \\ \hline 65\% \\ \hline 87\% \\ \hline 65\% \\ \hline 88\% \\ \hline 85\% \\ \hline 65\% \\ \hline 85\% \\ \hline 65\% \\ \hline 85\% \\ \hline 65\% \\ \hline 85\% \hline 85\% \hline 85\% \\ \hline 85\% \hline 85\% \hline 85\% \\ \hline 85\% \hline 85$	85% 60% ip g swarp 900 522 533 585 622 685 925 685 927 533 585 677 677 677 622 577 677 627 833 685 800 533 663 633	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2s \\ 53\% \\ \hline & 58\% \\ 55\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 60\% \\ 60\% \\ 60\% \\ 60\% \\ 67\% \\ 88\% \\ 80\% \\ 80\% \\ 82\% \\ 82\% \\ 80\% $	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 2_3 \\ \hline & 97\% \\ \hline & 58\% \\ 82\% \\ \hline & 62\% \\ \hline & 75\% \\ \hline & 88\% \\ \hline & 62\% \\ \hline & 75\% \\ \hline & 88\% \\ \hline & 60\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 72\% \\ \hline & 83\% \\ \hline & 51\% \\ \hline & 93\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 78\% \\ \hline & 82\% \\ \hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c c} 98\% \\ \hline 98\% \\ \hline 97\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c} 53\%\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{55\%}\\ \overline{53\%}\\ \overline{55\%}\\ \overline{55\%}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s t w/ \\ \hline sw_2 \\ 62\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 100\% \\ 55\% \\ 100\% \\ 6100\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 90\% \\ 88\% \\ 65\% \\ 65\% \\ 65\% \\ 100\% \\ 910\% \\ 92\% \\ 88\% \\ 65\% \\ 100\% \\ $	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline 8 & t w/s \\ s & t w/s \\ \hline 100\% \\ \hline 88\% \\ \hline 98\% \\ \hline 99\% \\ \hline 80\% \\ \hline 100\% \\ \hline 88\% \\ \hline 97\% \\ \hline 88\% \\ \hline 97\% \\ \hline 88\% \\ \hline 97\% \\ \hline 85\% \\ \hline 65\% \\ \hline 65\% \\ \hline 100\% \\ \hline 00\% \hline 00\% \\ \hline 00\% \hline 00\% \\ \hline 00\% $	85% 60% ip	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & sw_2-g \\ 97\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 62\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 92\% \\ \hline & 77\% \\ \hline & 49\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 65\% \\ \hline & 88\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 88\% \\ \hline & 80\% \\ \hline & 52\% \\ \hline \end{array}$	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 2_3 \\ 97\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 60\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 72\% \\ \hline & 49\% \\ \hline & 83\% \\ \hline & 83\% \\ \hline & 51\% \\ \hline & 93\% \\ \hline & 65\% \\ \hline & 65\% \\ \hline & 65\% \\ \hline & 62\% \\ \hline & 78\% \\ \hline & 82\% \\ \hline & 52\% \\ \hline \end{array}$
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	98% 97% sw 62% 68% 100% 55% 98% 100% 55% 98% 90% 90% 90% 100% 97% 98% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 90% 100% 93% 93% 93% 93% 93% 93% 93% 93% 93% 93% 93% 93% 93% 93% 93% <	$\begin{array}{c} 53\%\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{53\%}\\ \overline{55\%}\\ \overline{55\%}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline s t w/ \\ sw_2 \\ 62\% \\ 98\% \\ \hline 98\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 95\% \\ 65\% \\ 100\% \\ \hline 55\% \\ 100\% \\ 67\% \\ 93\% \\ 67\% \\ 93\% \\ 67\% \\ 90\% \\ 75\% \\ 100\% \\ 90\% \\ 75\% \\ 83\% \\ 67\% \\ 90\% \\ 75\% \\ 83\% \\ 65\% \\ 100\% \\ 92\% \\ 85\% \\ 65\% \\ 65\% \\ 100\% \\ 78\% \end{array}$	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline 8 & t w/s \\ s & t w/s \\ \hline 93\% \\ \hline 2 & sw_22_3 \\ \hline 62\% \\ \hline 100\% \\ \hline 98\% \\ \hline 80\% \\ \hline 100\% \\ \hline 88\% \\ \hline 97\% \\ \hline 85\% \\ \hline 65\% \\ \hline 100\% \\ \hline 75\% \\ \hline 100\% \\ \hline 75\% \\ \hline \end{array}$	85% 60% ip g swarp 900 522 533 585 622 685 925 685 927 533 585 677 677 677 622 577 677 627 833 685 800 533 663 633	55% 53% 53% 53% 73% 65% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 63% 63% 55% 55% 63% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55%	93% 93% 63% sw_2-g 97% 58% 53% 62% 62% 62% 62% 62% 62% 62% 62% 60% 92% 97% 49% 67% 88% 80% 65% 62% 65% 62% 77% 93% 82% 65% 62% 77% 78% 80% 52% 72%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 3 \\ 97\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 75\% \\ \hline & 88\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 92\% \\ \hline & 72\% \\ \hline & 49\% \\ \hline & 83\% \\ \hline & 51\% \\ \hline & 93\% \\ \hline & 80\% \\ \hline & 65\% \\ \hline & 65\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 83\% \\ \hline & 78\% \\ \hline & 82\% \\ \hline & 52\% \\ \hline & 73\% \\ \hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 2-g\\ 26\\ \hline 63\%\\ \hline 87\%\\ \hline 55\%\\ \hline 50\%\\ \hline 55\%\\ \hline 60\%\\ \hline 100\%\\ \hline 57\%\\ \hline 60\%\\ \hline 60\%\\ \hline 65\%\\ \hline 63\%\\ \hline 63\%\\ \hline 63\%\\ \hline 53\%\\ \hline 65\%\\ \hline 63\%\\ \hline 63\%\\ \hline 53\%\\ \hline 65\%\\ \hline 63\%\\ \hline 63\%\\ \hline 63\%\\ \hline 53\%\\ \hline 65\%\\ \hline 63\%\\ \hline 63$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 95\% \\ \hline 93\% \\ \hline 93\% \\ \hline 93\% \\ \hline s t w/s \\ \hline s t w/s \\ \hline 100\% \\ \hline 98\% \\ \hline 57\% \\ \hline 98\% \\ \hline 95\% \\ \hline 98\% \\ \hline 98\% \\ \hline 95\% \\ \hline 98\% \\ \hline 98\% \\ \hline 95\% \\ \hline 98\% \\ \hline 98\% \\ \hline 95\% \\ \hline 98\% \\ \hline 99\% \\ \hline 80\% \\ \hline 100\% \\ \hline 65\% \\ \hline 87\% \\ \hline 65\% \\ \hline 87\% \\ \hline 65\% \\ \hline 100\% \\ \hline 88\% \\ \hline 97\% \\ \hline 85\% \\ \hline 65\% \\ \hline 100\% \\ \hline 75\% \\ \hline 73\% \\ \hline 63\% \\ \hline 73\% \\ \hline 63\% \\ \hline 73\% \\ \hline 73\% \\ \hline 63\% \\ \hline 00\% \\ \hline 75\% \\ \hline 73\% \\ \hline 73\% \\ \hline 63\% \\ \hline 00\% \\ \hline 75\% \\ \hline 73\% \\ \hline 63\% \\ \hline 00\% \\ \hline 75\% \\ \hline 73\% \\ \hline 63\% \\ \hline 00\% \\ \hline 75\% \\ \hline 73\% \\ \hline 63\% \\ \hline 00\% \\ \hline 75\% \\ \hline 73\% \\ \hline 63\% \\ \hline 00\% \\ \hline 75\% \\ \hline 73\% \\ 73\% \\ \hline 73\% \\ 73\% \\ 73\% \\ 73\% \\ 73\% \\ 73\% $	85% 60% ip g swarp 900 522 533 585 622 685 833 585 622 685 921 853 492 777 645 675 522 557 675 685 800 531 685 801 533 634 801 533 634 635 635 531 632 522	55% 53% 53% 53% 53% 73% 65% 75% 65% 75% 52% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 88% 62% 46% 55% 63% 44% 55% 63% 63% 55% 63% 55% 63% 55% 63% 55% 52% 52% 55% 44%	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & sw_2-g \\ 97\% \\ \hline & 58\% \\ \hline & 53\% \\ \hline & 53\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 92\% \\ \hline & 77\% \\ \hline & 75\% \\ \hline & 75\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 92\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 60\% \\ \hline & 60\% \\ \hline & 92\% \\ \hline & 77\% \\ \hline & 78\% \\ \hline & 80\% \\ \hline & 52\% \\ \hline & 52\% \\ \hline & 72\% \\ \hline & 62\% \\ \hline \end{array}$	$\begin{array}{c c} 93\% \\ \hline & 93\% \\ \hline & 63\% \\ \hline & sw_2 3-; \\ 97\% \\ \hline 58\% \\ 58\% \\ \hline 58\% \\ \hline 62\% \\ 62\% \\ \hline 75\% \\ \hline 88\% \\ \hline 60\% \\ \hline 92\% \\ 92\% \\ \hline 72\% \\ \hline 49\% \\ \hline 88\% \\ \hline 60\% \\ \hline 65\% \\ \hline 83\% \\ \hline 78\% \\ \hline 82\% \\ \hline 73\% \\ \hline 63\% \\ \hline 63\% \\ \hline \end{array}$

Table C.11: Per level and query weighted precision when using MBHA benchmarks for Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	77%	75%	77%	77%	86%	79%	78%	78%
Adnan Ibrahim	91%	82%	91%	81%	98%	78%	78%	78%
Amman	88%	76%	88%	88%	69%	76%	94%	94%
Jarrar	83%	77%	77%	77%	86%	76%	77%	77%
Alishaa'	84%	50%	83%	83%	79%	76%	64%	64%
Nahawnd	81%	76%	77%	77%	95%	76%	95%	95%
Qersh	91%	59%	78%	78%	95%	77%	89%	89%
Asia	89%	76%	81%	80%	95%	77%	95%	94%
Shir (Shi3r)	62%	77%	77%	77%	77%	76%	77%	77%
Arafat	89%	78%	92%	87%	78%	76%	82%	82%
Cameron	83%	76%	77%	77%	78%	76%	78%	78%
Maliki	64%	62%	57%	57%	82%	79%	82%	82%
	74%	66%	70%	70%	82%	76%	77%	77%
Baqara Sakhr	59%	81%	59%	59%	94%	86%	94%	41%
Iqteran	50%	50%	50%	50%	62%	76%	78%	98%
Aziz	85%	83%	88%	88%	82%	88%	88%	88%
Ahram	79%	50%	84%	84%	80%	76%	95%	95%
Jalamah	84%	78%	81%	81%	89%	78%	88%	88%
Malek Abdullah	92%	78%	88%	88%	100%	100%	100%	100%
Jamaa Arabiya	61%	93%	95%	98%	92%	93%	77%	95%
Sakakini	62%	76%	62%	62%	98%	77%	98%	98%
Bursa	85%	87%	86%	85%	100%	94%	98%	98%
Ain	70%	76%	77%	77%	80%	76%	85%	85%
Thaheryah	83%	76%	83%	83%	92%	79%	79%	79%
Tarablus	86%	50%	86%	82%	88%	77%	91%	91%
Azhar	84%	77%	84%	84%	89%	78%	84%	84%
Arabiyah	83%	76%	83%	77%	81%	76%	79%	79%
Asad	54%	57%	84%	84%	45%	79%	71%	92%
Athraa'	98%	76%	95%	95%	88%	76%	94%	94%
			5070		0070			
Oodra	07%	76%	04%	04%	66%	76%	70%	70%
Qedra	97%	76%	94%	94%	66%	76%	79%	79%
·•	tw/s	t w/	s tw/	s tw/s	ip	ip	ip	ip
Dataset (Query)	t w/ s sw	t w/ 2-g	s t w/ sw_2-	s t w/ s -g sw_2_3	ip -g sw	ip 2-g	ip sw_2-g	ip sw_2_3-g
Dataset (Query) Amazon	t w/ s sw 78%	t w/ 2-g 79%	s t w/ sw_2- 78%	s t w/ s g sw_2_3 78%	ip -g sw 989	ip 2-g 6 79%	ip sw_2-g 97%	ip sw_2_3-g 97%
Dataset (Query) Amazon Adnan Ibrahim	t w/ s sw 78% 81%	t w/ 2-g 79% 89%	s t w/ sw_2- 78% 78%	s t w/ s -g sw_2_3 78% 100%	ip -g sw 989 919	ip 2-g 6 79% 6 79%	ip sw_2-g 97% 77%	ip sw_2_3-g 97% 77%
Dataset (Query) Amazon Adnan Ibrahim Amman	t w/ s sw 78% 81% 100%	t w/ 2-g 79% 89% 76%	s t w/ sw_2- 78% 78% 98%	s t w/ s -g sw_2_3 78% 100% 98%	ip -g sw 989 919 529	ip 2-g 6 79% 6 79% 6 75%	ip sw_2-g 97% 77% 55%	ip sw_2_3-g 97% 77% 55%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	t w/ s sw 78% 81% 100% 77%	t w/ 2-g 79% 89% 76% 76%	s t w/ sw_2- 78% 78% 98% 77%	s t w/s ⋅g sw_2_3 78% 100% 98% 77%	ip -g sw 98% 91% 52% 63%	ip 2-g 6 79% 6 79% 6 75% 6 76%	ip sw_2-g 97% 77% 55% 73%	ip sw_2_3-g 97% 77% 55% 77%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	t w/ s sw 78% 81% 100% 77% 66%	t w/ 2-g 79% 89% 76% 76% 50%	s t w/ sw_2- 78% 78% 98% 77% 95%	s t w/s ⋅g sw_2_3 100% 98% 77% 95%	ip -g sw 98% 91% 52% 63% 77%	ip 2-g 6 79% 6 79% 6 75% 6 76% 6 66%	ip sw_2-g 97% 77% 55% 73% 81%	ip sw_2_3-g 97% 77% 55% 77% 85%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	t w/ s sw 78% 81% 100% 77% 66% 98%	t w/ 2-g 79% 89% 76% 50% 76%	s t w/ sw_2 78% 78% 98% 77% 95% 98%	s t w/ s	ip -g sw 98% 91% 52% 63% 77% 78%	ip 2-g 6 79% 6 79% 6 75% 6 76% 6 66% 6 66% 6 76%	ip sw_2-g 97% 77% 55% 73% 81% 78%	ip sw_2_3-g 97% 77% 55% 77% 85% 78%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	t w/ s sw 78% 81% 100% 77% 66% 98% 100%	t w/ 2-g 79% 89% 76% 76% 50% 76% 76%	s t w/ sw_2 78% 78% 98% 77% 95% 98% 82%	s t w/s sg sw_2_3 78% 100% 98% 77% 95% 98% 82%	ip -g sw 989 919 529 639 779 789 819	ip 2-g 6 79% 6 79% 6 75% 6 76% 6 66% 6 66% 6 76% 6 76%	ip sw_2-g 97% 77% 55% 73% 81% 78% 83%	ip sw_2_3-g 97% 77% 55% 77% 85% 78% 83%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	t w/ s sw 78% 81% 100% 77% 66% 98% 100%	t w/ 2-g 79% 89% 76% 76% 50% 76% 76% 76% 100%	s t w/ sw_2- 78% 98% 77% 95% 98% 82% 50100%	s t w/s g sw_2_3 78% 100% 98% 77% 95% 98% 82% 100%	ip -g sw 989 919 529 639 779 789 819 889	ip 2-g 79% <	ip sw_2-g 97% 77% 55% 73% 81% 78% 83%	ip sw_2_3-g 97% 77% 55% 77% 85% 78% 83% 91%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	t w/ s sw 78% 81% 100% 66% 98% 100% 100% 62%	t w/ 2-g 79% 89% 76% 76% 50% 76% 76% 100% 77%	s t w/ sw_2 78% 78% 98% 77% 95% 98% 82% 0100% 62%		ip -g sw 989 919 529 639 779 789 819 889 779	ip 2-g 79% <	ip sw_2-g 97% 55% 73% 81% 78% 83% 83% 88% 72%	ip sw_2_3-g 97% 77% 55% 77% 85% 78% 83% 91% 72%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	$\begin{array}{c} {\bf t} \ {\bf w}/\ {\bf s} \\ {\bf sw} \\ \hline {\bf 8w} \\ \hline {\bf 78\%} \\ 81\% \\ 100\% \\ \hline {\bf 77\%} \\ 66\% \\ 98\% \\ 100\% \\ \hline {\bf 100\%} \\ \hline {\bf 62\%} \\ 100\% \end{array}$	t w/ 2-g 79% 89% 76% 50% 76% 76% 76% 100% 77% 76%	s t w/ sw_2: 78% 78% 98% 97% 95% 98% 82% 0100% 62% 100% 62%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	g sw 98% 91% 52% 63% 77% 78% 81% 88% 77% 93%	ip 2-g % 79% % 79% % 75% % 76% % 76% % 76% % 76% % 76% % 76% % 76% % 76% % 86% % 76% % 91%	ip sw_2-g 97% 77% 55% 73% 81% 78% 83% 88% 88% 72% 93%	ip sw_2_3-g 97% 55% 77% 85% 78% 83% 91% 72% 93%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	$\begin{array}{c} {\bf t} \ {\bf w}/\ {\bf s} \\ {\bf sw} \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 98\% \end{array}$	t w/ 2-g 79% 89% 76% 50% 76% 76% 76% 70% 76% 76% 75%	s t w/ sw_2 78% 78% 78% 98% 77% 95% 98% 0100% 62% 100% 86%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	g sw 98% 91% 52% 63% 77% 78% 81% 88% 77% 93% 88%	ip 2-g % 79% % 79% % 75% % 76% % 76% % 76% % 76% % 76% % 76% % 76% % 76% % 76% % 76% % 76% % 78%	ip 97% 97% 55% 73% 81% 83% 83% 83% 93% 93%	ip sw_2_3-g 97% 75% 77% 85% 78% 83% 91% 72% 93% 82%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	t w/ s sw 78% 81% 100% 77% 66% 98% 100% 100% 62% 100% 98% 84%	t w/ 2-g 79% 89% 76% 50% 76% 100% 76% 76% 62%	s t w/ sw_2- 78% 98% 95% 98% 82% 500% 62% 86% 86%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 989 919 529 639 779 789 819 889 779 939 889 809	ip 2-g ~ 79% ~ 79% ~ 75% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 76% ~ 78% ~ 79%	ip sw_2-g 97% 77% 55% 73% 81% 88% 88% 72% 93% 93% 84% 80%	ip sw_2_3-g 97% 77% 55% 77% 85% 78% 83% 91% 72% 93% 93% 82% 80%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	t w/ s sw 78% 81% 100% 77% 66% 98% 100% 100% 62% 100% 84% 83%	t w/ 2-g 79% 88% 76% 50% 76% 76% 76% 76% 76% 76% 76% 62% 76%	s t w/ sw_2: 78% 98% 77% 98% 98% 98% 82% 62% 62% 62% 100% 86% 89% 73%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 989 529 639 779 789 819 889 779 939 889 889 889 889	ip 2-g 6 79% 6 75% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 78% 6 76% 6 76% 6 76% 6 76%	ip 97% 97% 55% 73% 81% 78% 88% 88% 88% 88% 88% 88% 88% 80% 80%	ip sw_2_3-g 97% 77% 55% 77% 85% 85% 85% 83% 91% 91% 93% 83% 83% 82% 80% 88%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	t w/ s sw 78% 81% 100% 77% 66% 98% 100% 100% 62% 100% 98% 84%	t w/ 2-g 79% 89% 76% 50% 76% 100% 76% 76% 62%	s t w/ sw_2- 78% 98% 95% 98% 82% 500% 62% 86% 86%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 989 919 529 639 779 789 819 889 779 939 889 809	ip 2-g 6 79% 6 75% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 78% 6 76% 6 76% 6 76% 6 76%	ip sw_2-g 97% 77% 55% 73% 81% 88% 88% 72% 93% 93% 84% 80%	ip sw_2_3-g 97% 77% 55% 77% 85% 78% 83% 91% 72% 93% 93% 82% 80%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	t w/ s sw 78% 81% 100% 77% 66% 66% 98% 100% 100% 100% 98% 84% 83% 95% 98%	t w/ 2-g 79% 88% 76% 50% 76% 76% 76% 76% 76% 76% 76% 62% 76%	s tw/ sw_2 78% 78% 98% 77% 95% 98% 98% 98% 82% 100% 62% 100% 88% 89% 73% 94% 88%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 989 529 639 779 789 819 889 779 939 889 889 889 889	ip 2-g 6 79% 6 75% 6 76% 6 76% 6 76% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 75%	ip 97% 97% 55% 73% 81% 78% 88% 88% 88% 88% 88% 88% 88% 80% 80%	ip sw_2_3-g 97% 77% 55% 77% 85% 85% 85% 83% 91% 91% 93% 83% 83% 82% 80% 88%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	$\begin{array}{c c} t \ w/s \\ \hline sw \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 98\% \\ 84\% \\ 83\% \\ 95\% \end{array}$	tw/ 2-g 79% 89% 76% 50% 76% 100% 77% 75% 62% 76% 886%	s t w/ sw_2 78% 78% 98% 77% 95% 98% 62% 0100% 62% 100% 86% 73% 94%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 985 919 522 633 779 785 819 885 779 933 885 889 809 844 479 847	ip 2-g 6 79% 6 75% 6 75% 6 76% 6 76% 6 76% 6 76% 6 78% 6 78% 6 79% 6 76% 6 76% 6 76% 6 76% 6 75%	ip 97% 97% 55% 73% 81% 88% 88% 88% 88% 93% 88% 88% 88% 41%	ip sw_2_3-g 97% 55% 77% 85% 85% 78% 83% 91% 72% 93% 82% 80% 80% 88% 41%
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	t w/ s sw 78% 81% 100% 77% 66% 66% 98% 100% 100% 100% 98% 84% 83% 95% 98%	tw/ 2-g 79% 89% 76% 50% 76% 76% 76% 75% 62% 76% 50%	s tw/ sw_2 78% 78% 98% 77% 95% 98% 98% 98% 82% 100% 62% 100% 88% 89% 73% 94% 88%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 989 919 522 633 777 789 788 819 933 889 809 809 849 479 459 859	ip 2-g 6 79% 5 79% 6 75% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 79% 6 76% 6 76% 6 76% 6 76% 6 75% 6 75% 6 75% 6 75% 6 75% 6 75% 6 75% 6 75% 6 75% 6 79%	ip sw_2-g 97% 55% 73% 81% 78% 83% 88% 93% 93% 84% 80% 41% 91%	ip sw_2_3-g 97% 77% 55% 77% 85% 78% 83% 91% 72% 93% 82% 80% 80% 88% 41% 94%
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Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram	$\begin{array}{c c} t \ w/ \ s \\ \hline sw \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 62\% \\ 100\% \\ 98\% \\ 84\% \\ 83\% \\ 95\% \\ 98\% \\ 95\% \\ 98\% \\ 92\% \\ 100\% \\ \end{array}$	tw/ 2-g 79% 89% 76% 76% 76% 76% 76% 76% 76% 76% 76% 75% 62% 76% 86% 50% 84% 84%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 98% 919 52% 633 77% 88% 819 77% 933 88% 80% 80% 844 47% 85% 80% 77% 78%	ip 2-g 6 79% 70% 70% 75% 76% 6 76% 6 76% 6 91% 6 91% 6 73% 6 73% 6 73% 6 73% 6 75% 6 77% 6 77%	ip 97% 97% 55% 73% 81% 83% 88% 80% 41% 91% 86% 79%	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{sw_2_3-g} \\ 97\% \\ 77\% \\ 55\% \\ 77\% \\ 85\% \\ 78\% \\ 83\% \\ 91\% \\ 93\% \\ 83\% \\ 91\% \\ 91\% \\ 88\% \\ 41\% \\ 94\% \\ 86\% \\ 41\% \\ 94\% \\ 86\% \\ 79\% \end{array}$
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah	$\begin{array}{c c} t \ w/ \ s \\ \hline sw \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 98\% \\ 84\% \\ 98\% \\ 84\% \\ 83\% \\ 95\% \\ 98\% \\ 92\% \\ 100\% \\ 97\% \end{array}$	t w/ 2-g 79% 89% 76% 76% 76% 76% 76% 76% 62% 76% 86% 50% 50% 76% 88% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw. 989 911 522 639 779 789 889 889 889 889 889 889 849 849 849 8	ip ig 2-g 6 79% 6 75% 6 76% 6 66% 6 66% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 71% 6 71% 6 75% 6 75% 6 75% 6 75% 6 75% 6 77% 6 77% 6 71% 71% 71% 6 81%	ip 97% 97% 55% 73% 81% 83% 83% 88% 72% 93% 84% 80% 80% 80% 80% 80% 80% 80% 91% 91% 94%	$\begin{array}{c c} \mathbf{ip} \\ \mathbf{sw}_2_3-\mathbf{g} \\ 97\% \\ 77\% \\ 55\% \\ 77\% \\ 85\% \\ 78\% \\ 83\% \\ 91\% \\ 72\% \\ 83\% \\ 91\% \\ 88\% \\ 88\% \\ 88\% \\ 88\% \\ 41\% \\ 94\% \\ 86\% \\ 86\% \\ 79\% \\ 77\% \\ \end{array}$
Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya	$\begin{array}{c c} t \ w/ \ s \\ \hline sw \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 62\% \\ 100\% \\ 98\% \\ 84\% \\ 83\% \\ 95\% \\ 98\% \\ 98\% \\ 95\% \\ 98\% \\ 92\% \\ 100\% \\ 100\% \\ 100\% \end{array}$	t w/ 2-g 79% 88% 76% 76% 76% 76% 76% 76% 77% 77% 88% 86% 86% 76% 76% 76% 76% 76% 76% 76% 76% 76% 100%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g swa 98% 916 529 633 77% 78% 819 88% 77% 93% 88% 80% 844 47% 85% 80% 77% 93% 80% 77% 80% 77% 80% 77% 80% 77% 80% 77% 80% 77% 80% 77% 80% 80% 77% 80%	ip i2-g 6 79% 6 79% 6 75% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 76% 6 75% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 77% 6 79%	ip 97% 97% 55% 73% 81% 78% 83% 88% 88% 93% 84% 80% 80% 80% 41% 91% 91% 91% 91% 94% 79%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa	$\begin{array}{c c} t \ w/ \ s \\ \hline sw \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 98\% \\ 84\% \\ 98\% \\ 83\% \\ 98\% \\ 84\% \\ 95\% \\ 98\% \\ 92\% \\ 100\% \\ 97\% \\ 100\% \\ 100\% \\ 100\% \\ 97\% \end{array}$	t w/ 2-g 79% 89% 50% 76% 76% 76% 76% 76% 76% 76% 75% 62% 50% 84% 50% 84% 100% 77% % 92%	s tw/ sv_2 78% 98% 77% 95% 98% 98% 98% 82% 000% 62% 100% 86% 88% 94% 80% 94% 80% 92% 83% 100% 93% 93%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 989 919 529 633 779 788 889 889 889 889 889 889 889 889	ip ip 2-g 6 79% 6 75% 6 76% 6 76% 6 76% 6 78% 6 91% 6 91% 6 78% 6 76% 6 75% 6 75% 6 77% 6 77% 6 77% 6 79% 6 76% 6 77% 6 76% 6 77% 6 76% 6 76% 6 76%	ip 97% 97% 55% 73% 81% 83% 83% 83% 84% 80% 80% 80% 80% 80% 80% 80% 80	$\begin{array}{ c c c c c c c c c c c c c$
Dataset (Query) Amazon Adnan Ibrahim Adnan Ibrahim Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain	$\begin{array}{c c} t \ w/ \ s \\ \hline t \ w/ \ s \\ \hline sw \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 62\% \\ 100\% \\ 98\% \\ 84\% \\ 83\% \\ 95\% \\ 98\% \\ 95\% \\ 98\% \\ 95\% \\ 98\% \\ 95\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 97\% \\ 91\% \\ \end{array}$	t w/ 2-g 79% 89% 76% 76% 50% 76% 76% 76% 76% 76% 76% 76% 88% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g swa 98% 91% 529 633 77% 78% 819 88% 877 933 88% 88% 84% 47% 80% 84% 77% 80% 77% 80% 77% 80% 77% 80% 77% 80% 77% 80% 81% 81%	ip 2-g 6 79% 6 79% 6 75% 6 76% 6 76% 6 76% 6 76% 6 81% 6 79% 6 77% 6 77% 6 76% 6 79% 6 77% 6 79% 6 79% 6 79% 6 79% 6 79% 6 79%	ip 97% 97% 55% 73% 81% 88% 88% 88% 88% 88% 88% 80% 80	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c c} t \ w/ \ s \\ \hline sw \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 88\% \\ 83\% \\ 98\% \\ 84\% \\ 83\% \\ 95\% \\ 98\% \\ 84\% \\ 83\% \\ 92\% \\ 100\% \\ 100\% \\ 100\% \\ 97\% \\ 91\% \\ 94\% \\ 100\% \\ \end{array}$	t w/ 2-g 79% 89% 76% 76% 76% 76% 76% 76% 76% 76% 76% 75% 75% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76	s tw/ s tw/ sw_2: 78% 98% 77% 95% 98% 98% 98% 82% 600% 62% 100% 62% 100% 86% 89% 94% 80% 94% 83% 100% 00% 00% 00% 100% 00% 100% 00%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 919 529 633 779 788 819 885 809 933 885 809 933 889 809 84479 855 809 7799 769 809 779 809 789 819 866 849 866 549	ip ip 2-g 6 79% 70% 75% 6 75% 6 76% 6 76% 6 76% 6 91% 6 77% 6 77% 6 77% 6 77% 6 76% 6 77% 6 77% 6 77% 6 77% 6 76% 6 77% 6 77% 6 77% 6 77% 6 76% 6 77% 6 77% 6 76% 6 77% 6 76% 6 75% 6 75% 6 75% 6 50%	ip sw_2-g 97% 55% 77% 81% 81% 83% 88% 88% 88% 80% 80% 80% 80% 80	$\begin{array}{ c c c c c c c c c c c c c$
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Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/\ \mathbf{s} \\ \mathbf{s} \\ \mathbf{w}/\ \mathbf{s} \\ $	t w/ 2-g 79% 88% 76% 76% 76% 76% 76% 77% 77% 75% 62% 75% 86% 86% 50% 84% 76% 77% 78% 76% 77% 75% 77% 79% 88% 79% 88% 76% 75% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76	s tw/ sw_2 78% 98% 778% 98% 98% 98% 98% 98% 82% 62% 100% 62% 62% 100% 88% 89% 94% 89% 94% 80% 92% 83% 100% 83% 88% 88% 88% 88% 88% 88% 88	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 98% 919 52% 633 77% 88% 819 78% 819 88% 80% 80% 844 47% 85% 80% 779% 85% 80% 76% 80% 76% 80% 76% 80% 76% 80% 76% 80% 54% 74% 76% 76% 54% 76% 76% 80% 54% 74% 76% 76% 76% 76% 76% 76% 76% 76% 47%	ip ig 2-g 6 79% 5 70% 6 75% 6 76% 6 66% 6 76% 6 76% 6 76% 6 78% 6 77% 6 77% 6 77% 6 77% 6 77% 6 76% 6 76% 6 76% 6 76% 6 76% 6 75% 6 75% 6 76% 6 75% 6 76% 6 75% 6 76% 6 76% 6 75% 6 76%	ip 97% 97% 55% 73% 81% 83% 83% 84% 80% 84% 80% 41% 91% 91% 86% 80% 41% 91% 91% 86% 80% 86% 85% 84% 85% 85% 86% 85% 88% 88% 88% 88% 88% 88% 88	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Dataset (Query) Amazon Adnan Ibrahim Adnan Ibrahim Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/\ \mathbf{s} \\ \mathbf{w}/\ \mathbf{s} \\ \mathbf{sw} \\ 78\% \\ 81\% \\ 100\% \\ 77\% \\ 66\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 84\% \\ 83\% \\ 95\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 98\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 100\% \\ 83\% \\ \end{array}$	t w/ 2-g 79% 88% 76% 76% 76% 76% 76% 77% 77% 77% 77% 86% 77% 88% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76	s tw/ s tw/ sw_2: 78% 98% 77% 98% 98% 82% 62% 100% 88% 62% 100% 88% 94% 80% 94% 80% 92% 83% 94% 83% 73% 84% 84% 84% 84% 84% 84% 84% 84	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ip -g sw 98% 916 529 633 777% 937 88% 807 77% 933 88% 809 844 477 937 85% 809 779 937 86% 777% 800 778% 86% 844 86% 542 544 742 742	ip ip 2-g 6 79% 70% 70% 6 75% 6 76% 6 76% 6 76% 6 76% 6 76% 6 77% 6 77% 6 77% 6 76% 6 77% 6 77% 6 76% 6 77% 6 76% 6 76% 6 76% 6 76% 6 75% 6 50% 6 75% 6 50% 6 76% 6 75% 6 76% 6 75% 6 75% 6 75% 6 75% 6 75% 6	ip sw_2-g 97% 55% 73% 81% 78% 83% 84% 80% 80% 41% 91% 91% 91% 91% 91% 91% 91% 9	ip sw_2_3-g 97% 55% 77% 85% 77% 85% 77% 85% 83% 91% 93% 80% 80% 88% 41% 94% 86% 79% 78% 88% 85% 87% 85% 87% 83% 83% 83% 79% 78% 83% 83% 83% 83% 83% 83% 83%

C.3.3 Google and Bing/Clear Queries

Table C.12: Per level and query macro F-measure when using MBHA benchmarks for both.

		t	t	t	t	s	s	s	s
	Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Adaman 56% 33% 63% 63% 66%						75%	56%		
Jarrar 40% 37% 61% 61% 44% 42% 66% 66% Nahawnd 49% 48% 40% 39% 39% 63									
Alishaa'39%39%39%39%63%63%63%63%Nahawad49%48%40%40%53%40%82%63%63%Qersh83%40%51%51%51%42%40%41%41%Asia87%56%65%65%65%63%63%63%63%Bir (Shiār)74%67%60%60%64%42%44%63%63%Arafat44%37%51%51%54%51%53%52%63%63%Cameron66%37%40%40%40%40%58%44%75%75%Bagara40%40%40%40%58%58%68%44%75%75%Sakhr46%30%58%58%58%68%68%47%84%48%Airam49%43%43%43%43%43%58%58%58%58%58%Janaa Arabiy43%43%43%43%43%43%43%58%									
Nahawnd 49% 49% 49% 57% 58% 82% 82% Qersh 83% 40% 51% 51% 52% 42% 46% 11% 41% Asia 87% 56% 85% 85% 92% 66% 66% 65% 65% Shir (Shir) 74% 67% 69% 64% 42% 45% 55% 52% 52% 52% Cameron 66% 37% 60% 40% 40% 40% 55% 41% 75% 75% Sakhr 66% 56% 68% 68% 67% 33% 77% 77% Jatamah 60% 56% 68% 68% 47% 84% 88% 86% Jatamah 60% 59% 59% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57% 57%									
Ásia 87% 56% 85% 85% 92% 66% 665% 65% Shir (Shi3r) 73% 67% 69% 69% 64% 42% 45% 52% 62% 63% Cameron 66% 37% 51% 51% 44% 75% 52% 52% Maliki 25% 26% 58% 43% 33% 77% 33% 33% 75% 53% 33% 75% 53% 33% 75% 53% 33% 75% 53% 33% 75% 33% 75% 53% 53% 53% 55%									
	Shir (Shi3r)	74%	67%	69%	69%	64%	42%	45%	63%
Maliki 25% 58% 35% 27% 33% 33% Baqara 40% 40% 40% 58% 44% 77% 75% Sakhr 46% 30% 44% 38% 76% 33% 71% 75% Aziz 50% 50% 50% 50% 50% 64% 43% 44% Aziz 50% 50% 50% 50% 50% 52% 90% 90% Jalamah 60% 51% 53% 43% 43% 77% 77% 77% Jamaa 77% 57% 57% 57% 55% 51% 93% 99% 97% Ain 47% 50% 35% 57% 57% 55% 56% 58% Tarabus 55% 50% 57% 57% 54% 56% 56% 56% 56% 56% 56% 56% 56% 56% 56% 56% 56% 56	Arafat	44%	37%	51%	51%	45%	55%	52%	52%
	Cameron	66%	37%	40%	40%	72%	54%	71%	69%
	Maliki	25%	26%	58%	58%	35%	27%	33%	33%
Sakhr46%30%44%38%76%33%71%71%Iteran60%56%58%58%68%47%84%48%Aziz50%50%50%50%56%69%54%88%Ahram49%43%43%43%97%52%69%96%96%Jalamah60%41%58%82%59%43%77%77%77%Malek Abdullah69%59%59%87%98%99%99%97%65%65%Jamaa Arabiya43%43%43%43%85%88%86%Sakakini48%48%48%44%97%65%97%65%59%Bursa57%57%57%57%57%57%57%65%39%98%99%Tarablus55%60%50%50%86%38%77%50%Arabiyah55%50%50%50%86%38%77%50%Arabiyah55%50%50%50%86%38%77%50%Arabiyah55%51%54%65%50%27%54%66%Asad39%2.8su2.gsu2.gsu2.gsu2.gQetra52%40%54%51%51%68%57%51%51%66%74%Jarrat41%42%44%44%44%	Bagara	40%	40%	40%	40%	58%	44%	75%	75%
Áziz 50% 50% 50% 56% 69% 54% 88% Jalamah 60% 41% 58% 82% 59% 43% 77% 77% Malek Abdullah 60% 41% 58% 82% 59% 43% 77% 77% Jamaa Arabiya 43% 43% 43% 43% 85% 86% 97% 65% 97% 97% 65% 97% 65% 97% 65% 97% 65% 97% 65% 97% 65% 97% 65% 97% 65% 97% 65% 97% 65% 65% 56% 54% 54% 39% 58% 51% 51% 66% 66% 66% 66% 66% 66%									
Jalamah 60% 41% 58% 82% 59% 43% 77% 77% Malek Abdullah 69% 59% 59% 87% 98% 99% 99% 99% 97% Jamaa Arabiya 43% 43% 43% 43% 43% 43% 85% 89% 88% 86% Sakakini 44% 48% 48% 48% 48% 48% 97% 65% 97% 65% Bursa 57% 57% 57% 57% 57% 51% 93% 92% Ain 47% 50% 35% 47% 54% 39% 58% 58% Thaheryah 43% 39% 51% 51% 46% 46% 59% Arabiyah 55% 37% 54% 51% 65% 38% 46% 46% Arabiyah 55% 37% 54% 51% 66% 66% Arabiyah 55% 1% 54% 50% 50% 27% 54% 67% Athraa' 17% tw/s tw/s tw/s ip ip ip ip Dataset (Query) sw $2x$ sw_2 sw_2 $2s_2$ sw_2 $2s_2$ sw_2 $2s_2$ sw_2 $2s_2$ sw_2 $2s_2$ $3m_2$ $2s_2$ $3m_2$ $2s_2$ $3m_2$ $2s_2$ $3m_2$ $2s_2$ $3m_2$ $2s_2$ $3m_2$ $3m_2$ $3m_2$ $3m_2$ $3m_2$ $3m_2$ $3m_2$ $3m_2$ <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
Sakakini48%48%48%97%65%97%66%Bursa57%57%57%57%51%95%51%93%92%Ain47%50%35%47%54%39%58%58%58%Thaheryah43%39%54%54%54%58%45%59%Tarablus55%60%50%50%50%50%50%50%Azhar51%39%54%54%51%47%46%46%Arabiyah55%37%54%54%54%69%51%66%66%Asad39%28%54%65%50%27%54%66%66%Athraa'47%39%15%51%51%37%54%66%96%Qedra52%40%54%54%93%37%37%37%37%Amazon99%37%51%51%57%68%52%43%74%Aman53%58%57%57%68%52%43%74%Aman53%58%57%51%51%57%57%68%37%77%Adnan Ibrahim95%68%57%51%51%57%57%68%57%57%57%68%37%74%Amazon99%39%51%51%51%57%57%68%52%43%74%Amazon95% </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Jamaa Arabiya	43%	43%	43%	43%	85%	89%	88%	86%
Ain 47% 54% 54% 54% 54% 54% 54% 54% 54% 55% 65% 65% 56% 66% 46% <td>Sakakini</td> <td>48%</td> <td>48%</td> <td>48%</td> <td>48%</td> <td>97%</td> <td>65%</td> <td>97%</td> <td>65%</td>	Sakakini	48%	48%	48%	48%	97%	65%	97%	65%
Ain 47% 54% 54% 54% 54% 54% 54% 55% 65% 65% 45% 46% 55% 56% 66% 66% 66% Arabiyah 55% 37% 54% 65% 50% 27% 54% 67% 66% 96% 96% 96% 96% 96% 96% 96% 96% 96% 96% 96% 95% 68% 57% 54% 60% 51% 37%<	Bursa	57%	57%	57%	57%	95%	51%	93%	92%
Tarablus 55% 60% 50% 50% 86% 38% 77% 50% Azbar 51% 51% 51% 51% 46% 46% 46% 46% Arabiyah 55% 37% 54% 65% 50% 27% 54% 66% 66% Asad 39% 28% 54% 65% 50% 27% 54% 66% 66% Asad 39% 28% 54% 65% 50% 27% 54% 66% 66% Qedra 52% 40% 54% 54% 93% 74% 17% 17% 17% 17% 17% 1									
Arabiyah 55% 37% 54% 54% 69% 51% 66% 66% Asad 39% 28% 54% 66% 50% 27% 54% 66% 97% Athraa' 47% 39% 47% 47% 97% 48% 96% 96% Qedra 52% 40% 54% 54% 97% 48% 96% 93% 93% 93% 93% Dataset (Query) sw 2-g sw_2-g sw_2-g sw_2-g sw_2-g 37% 37% 37% 37% Adnan Ibrahim 95% 68% 57% 57% 54% 60% 51% 57% 57% Jarrar 44% 42% 44% 44% 42% 44% 42% 44% 42% 44% 42% 44% 42% 44% 42% 44% 42% 44% 42% 44% 42% 44% 42% 44% 42% 44% 44%									
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Arabiyah 58% 45% 56% 56% 50% 44% 56% 64% Asad 99% 25% 57% 57% 31% 41% 54% 60% Athraa' 55% 56% 98% 98% 52% 53% 84% 84%	Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/\ \mathbf{s} \\ \mathbf{sw} \\ 99\% \\ 95\% \\ 53\% \\ 44\% \\ 78\% \\ 44\% \\ 52\% \\ 100\% \\ 65\% \\ 82\% \\ 74\% \\ 97\% \\ 72\% \\ 44\% \\ 54\% \\ 50\% \\ 56\% \\ 99\% \\ 90\% \\ 90\% \\ 90\% \\ 43\% \\ 97\% \\ 92\% \\ 46\% \\ 100\% \\ \end{array}$	40% t w/ s 2-g 37% 68% 58% 42% 49% 69% 64% 46% 42% 46% 42% 46% 42% 52% 51% 42% 52% 51% 42% 52% 51% 43%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	93% ip g sw 37% 68% 60% 42% 70% 70% 76% 70% 77% 76% 74% 68% 42% 71% 66% 42% 71% 66% 42% 11% 29% 61% 38% 40% 37% 37% 52% 45% 80% 80%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad 99% 25% 57% 57% 31% 41% 54% 60% Athraa' 55% 56% 98% 98% 52% 53% 84% 84%	Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/ \ \mathbf{s} \\ \mathbf{sw} \\ 99\% \\ 95\% \\ 53\% \\ 44\% \\ 78\% \\ 44\% \\ 52\% \\ 100\% \\ 65\% \\ 82\% \\ 74\% \\ 97\% \\ 72\% \\ 44\% \\ 54\% \\ 50\% \\ 56\% \\ 99\% \\ 100\% \\ 43\% \\ 97\% \\ 92\% \\ 46\% \\ 100\% \\ 81\% \end{array}$	$\begin{array}{c c} 40\% \\ \hline & \mathbf{w/s} \\ \mathbf{2-g} \\ \mathbf{37\%} \\ 68\% \\ 58\% \\ 42\% \\ 39\% \\ 56\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 48\% \\ 52\% \\ 51\% \\ 52\% \\ 51\% \\ 52\% \\ 51\% \\ 52\% \\ 51\% \\ 63\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	93% ip g sw 37% 68% 60% 79% 70% 77% 77% 76% 73% 76% 71% 68% 422% 41% 29% 71% 61% 38% 40% 37% 37% 52% 80% 49%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad 99% 25% 57% 57% 31% 41% 54% 60% Athraa' 55% 56% 98% 98% 52% 53% 84% 84%	Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/ \ \mathbf{s} \\ \mathbf{sw} \\ 99\% \\ 95\% \\ 53\% \\ 44\% \\ 78\% \\ 44\% \\ 52\% \\ 100\% \\ 65\% \\ 82\% \\ 74\% \\ 97\% \\ 72\% \\ 44\% \\ 54\% \\ 50\% \\ 56\% \\ 99\% \\ 100\% \\ 43\% \\ 97\% \\ 92\% \\ 46\% \\ 100\% \\ 81\% \end{array}$	$\begin{array}{c c} 40\% \\ \hline & \mathbf{w/s} \\ \mathbf{2-g} \\ \mathbf{37\%} \\ 68\% \\ 58\% \\ 42\% \\ 39\% \\ 56\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 42\% \\ 48\% \\ 52\% \\ 51\% \\ 52\% \\ 51\% \\ 52\% \\ 51\% \\ 52\% \\ 51\% \\ 63\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	93% ip g sw 37% 68% 60% 79% 70% 77% 77% 76% 73% 76% 71% 68% 422% 41% 29% 71% 61% 38% 40% 37% 37% 52% 80% 49%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Athraa' 55% 56% 98% 98% 52% 53% 84% 84%	Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/\ \mathbf{s} \\ \mathbf{sw} \\ 99\% \\ 99\% \\ 95\% \\ 53\% \\ 53\% \\ 44\% \\ 78\% \\ 49\% \\ 52\% \\ 100\% \\ 65\% \\ 82\% \\ 74\% \\ 97\% \\ 97\% \\ 97\% \\ 99\% \\ 100\% \\ 43\% \\ 97\% \\ 92\% \\ 46\% \\ 81\% \\ 49\% \end{array}$	$\begin{array}{c c} 40\% \\ \hline & 40\% \\ \hline & v/s \\ 2-g \\ 37\% \\ 68\% \\ 58\% \\ 42\% \\ 39\% \\ 56\% \\ 47\% \\ 69\% \\ 58\% \\ 56\% \\ 64\% \\ 42\% \\ 46\% \\ 42\% \\ 46\% \\ 42\% \\ 52\% \\ 51\% \\ 42\% \\ 71\% \\ 42\% \\ 55\% \\ 63\% \\ 63\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	93% ip g sw 37% 68% 60% 42% 47% 70% 70% 77% 76% 73% 76% 73% 76% 73% 68% 42% 41% 29% 61% 68% 61% 37% 67% 61% 37% 38% 40% 37% 45% 80% 40% 40%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
	Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/\ \mathbf{s} \\ \mathbf{sw} \\ 99\% \\ 99\% \\ 95\% \\ 53\% \\ 44\% \\ 78\% \\ 49\% \\ 52\% \\ 100\% \\ 65\% \\ 82\% \\ 74\% \\ 54\% \\ 50\% \\ 56\% \\ 99\% \\ 90\% \\ 100\% \\ 81\% \\ 97\% \\ 92\% \\ 46\% \\ 100\% \\ 81\% \\ 49\% \\ 58\% \end{array}$	$\begin{array}{c} 40\% \\ \hline \\ 40\% \\ \hline \\ 1 \ \ \ \ \ \ \ \ \ \ \ \ \$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} t w/s \\ \hline sw_2_3-z \\ 51\% \\ 57\% \\ 54\% \\ 44\% \\ 44\% \\ 49\% \\ 51\% \\ 100\% \\ 63\% \\ 52\% \\ 69\% \\ 69\% \\ 69\% \\ 69\% \\ 69\% \\ 69\% \\ 84\% \\ 44\% \\ 48\% \\ 94\% \\ 86\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 43\% \\ 70\% \\ 50\% \\ 80\% \\ 45\% \\ 48\% \\ 56\% \\ 80\% \\ 48\% \\ 56\% \\ 80\% \\ 56\% \\ \end{array}$	93% ip g sw 37% 68% 60% 42% 70% 70% 70% 70% 70% 73% 74% 68% 42% 71% 61% 42% 71% 61% 337% 52% 40% 37% 52% 45% 80% 49% 40% 50%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
	Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c} \mathbf{t} \ \mathbf{w}/\ \mathbf{s} \\ \mathbf{sw} \\ 99\% \\ 95\% \\ 53\% \\ 44\% \\ 78\% \\ 44\% \\ 52\% \\ 100\% \\ 65\% \\ 82\% \\ 74\% \\ 97\% \\ 72\% \\ 44\% \\ 54\% \\ 50\% \\ 56\% \\ 99\% \\ 100\% \\ 81\% \\ 49\% \\ 99\% \\ 99\% \\ \end{array}$	40% t w/s 2-g 37% 68% 58% 42% 47% 69% 58% 50% 64% 42% 42% 46% 42% 42% 42% 52% 51% 42% 51% 63% 63% 63% 63% 63% 45% 52%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} t w/s \\ \hline sw_2_3-z \\ 51\% \\ 57\% \\ 54\% \\ 44\% \\ 51\% \\ 49\% \\ 51\% \\ 100\% \\ 63\% \\ 52\% \\ 63\% \\ 52\% \\ 69\% \\ 34\% \\ 76\% \\ 44\% \\ 48\% \\ 44\% \\ 48\% \\ 94\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 86\% \\ 50\% \\ 80\% \\ 45\% \\ 48\% \\ 48\% \\ 56\% \\ 57\% \\ 50\% \\ 57\% \\ 57\% \\ 57\% \\ 50\% \\ 57\% \\ 50\% \\ 57\% \\ 50\% \\$	93% ip g sw 37% 68% 60% 42% 70% 77% 76% 78% 79% 70% 76% 61% 38% 42% 66% 42% 71% 66% 61% 38% 40% 37% 52% 45% 40% 40% 50% 40% 50% 31%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Table C.13: Per level and query weighted recall when using MBHA benchmarks for both.

	t	t	t	t	s	s	s	s
Dataset (Query		2-g	sw_2-g	sw_2_3-g	\mathbf{sw}	2-g	sw_2-g	sw_2_3-g
Amazon	53%	52%	70%	55%	76%	63%	68%	53%
Adnan Ibrahim	ı 74%	53%	62%	72%	82%	67%	79%	73%
Amman	61%	61%	61%	61%	87%	53%	70%	70%
Jarrar	53%	52%	66%	66%	53%	54%	69%	69%
Alishaa'	51%	51%	51%	51%	66%	51%	66%	66%
Nahawnd	53%	53%	53%	53%	85%	55%	83%	83%
Qersh	83%	53%	59%	59%	52%	56%	50%	50%
Asia	88%	63%	85%	85%	92%	69%	71%	68%
Shir (Shi3r)	76%	70%	72%	72%	68%	54%	56%	67%
Arafat	55%	52%	59%	59%	54%	62%	58%	58%
Cameron	69%	52%	53%	53%	73%	61%	73%	72%
Maliki	36%	37%	64%	64%	41%	37%	42%	42%
Bagara	52%	52%	52%	52%	63%	55%	76%	76%
Sakhr	49%	32%	47%	43%	78%	$\frac{33\%}{42\%}$	73%	74%
Iqteran	72%	63%	63%	63%	71%	57%	84%	58%
Aziz	54%	54%	54%	54%	63%	72%	61%	88%
Ahram	58%	52%	52%	52%	97%	60%	96%	96%
Jalamah	65%	53%	63%	83%	63%	54%	78%	78%
Malek Abdulla		59%	60%	88%	98%	99%	99%	98%
Jamaa Arabiya		52%	52%	52%	85%	89%	88%	86%
Sakakini	58%	58%	58%	58%	98%	68%	98%	68%
Bursa	61%	61%	61%	61%	95%	59%	93%	93%
Ain	57%	58%	51%	57%	61%	51%	63%	63%
Thaheryah	53%	53%	61%	61%	63%	56%	55%	64%
Tarablus	58%	65%	58%	58%	86%	51%	78%	58%
Azhar	58%	53%	58%	58%	54%	56%	53%	53%
Arabiyah	62%	52%	61%	61%	72%	59%	68%	68%
				01/0	12/0	0370	0070	0070
		40.07	E 1707	6707	6007	2007	6007	7007
Asad	47%	40%	57%	67%	62%	39%	62%	72%
Asad Athraa'	47% 57%	53%	57%	57%	97%	57%	96%	96%
Asad	47% 57% 60%	53% 53%	57% 61%	57% 61%	97% 93%	57% 50%	96% 93%	96% 93%
Asad Athraa' Qedra	47% 57% 60% tw/s	53% 53% t w/ s	57% 61% s t w/ s	57% 61% t w/s	97% 93% ip	57% 50% ip	96% 93% ip	96% 93% ip
Asad Athraa'	47% 57% 60%	53% 53%	57% 61%	57% 61% t w/s	97% 93% ip	57% 50%	96% 93% ip	96% 93% ip
Asad Athraa' Qedra	47% 57% 60% t w/ s sw 99%	53% 53% t w/ s 2-g 50%	57% 61% s t w/ s	57% 61% t w/ s sw_2_3- 59%	97% 93% ip	57% 50% ip 2-g	96% 93% ip sw_2-g 52%	96% 93% ip sw_2_3-1 52%
Asad Athraa' Qedra Dataset (Query)	47% 57% 60% t w/ s sw	53% 53% t w/ s 2-g	57% 61% s t w/ s sw_2-g	57% 61% t w/ s sw_2_3-	97% 93% ip g sw	57% 50% ip 2-g 52%	96% 93% ip sw_2-g 52%	96% 93% ip sw_2_3-;
Asad Athraa' Qedra Dataset (Query) Amazon	47% 57% 60% t w/ s sw 99%	53% 53% t w/ s 2-g 50%	57% 61% 5 t w/ s 5 w_2-g 59%	57% 61% t w/ s sw_2_3- 59%	97% 93% ip g sw 52%	57% 50% ip 2-g 52% 58%	96% 93% ip sw_2-g 52% 52%	96% 93% ip sw_2_3-1 52%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	47% 57% 60% t w/ s sw 99% 95%	53% 53% t w/ s 2-g 50% 71%	57% 61% 5 t w/ s 59% 63%	57% 61% t w/ s sw_2_3-g 59% 63%	97% 93% ip g sw 52% 70%	57% 50% ip 2-g 52% 58% 59%	96% 93% ip sw_2-g 52% 52% 59%	96% 93% ip sw_2_3- 52% 76%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	47% 57% 60% t w/ s sw 99% 95% 59%	53% 53% t w/ s 2-g 50% 71% 63%	57% 61% s t w/ s sw_2-g 59% 63% 62%	57% 61% t w/ s sw_2_3- 59% 63% 60%	97% 93% ip g sw 52% 70% 62%	57% 50% 2-g 52% 58% 58% 59% 54%	96% 93% ip 52% 52% 52% 52% 52% 52% 55%	96% 93% ip sw_2_3-; 52% 76% 59%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	47% 57% 60% t w/ s sw 99% 95% 59% 53% 79%	53% 53% t w/ s 2-g 50% 71% 63% 54% 51%	57% 61% 5 t w/s 59% 63% 62% 53%	57% 61% t w/ s sw_2_3- 63% 60% 53% 59%	97% 93% ip g sw 52% 70% 62% 54% 79%	57% 50% ip 2-g 52% 58% 59% 54% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52%	96% 93% ip sw_2-g 52% 52% 55% 55% 84%	96% 93% ip sw_2_3- 52% 76% 59% 54% 83%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	47% 57% 60% t w/ s 99% 95% 53% 53% 79% 53%	53% 53% tw/s 2-g 50% 71% 63% 54% 51% 60%	57% 61% s t w/s sw_2-g 59% 62% 53% 59% 53%	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2 \ 3 - \mathbf{g} \\ \hline 59\% \\ \hline 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 53\% \end{array}$	97% 93% ip g sw 52% 70% 62% 54% 79% 73%	57% 50% ip 2-g 52% 58% 59% 54% 52% 6 54% 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 7 <th7< th=""> 7</th7<>	96% 93% ip sw_2-g 52% 52% 55% 55% 84% 73%	96% 93% sw_2 3- 52% 76% 59% 54% 83% 73%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	47% 57% 60% t w/ s sw 99% 95% 59% 53% 79% 53% 60%	53% 53% 53% tw/s 2-g 50% 71% 63% 54% 51% 60% 57%	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline 5 \\ \hline 6 \\ \hline 6 \\ \hline 6 \\ \hline 5 \\ 5 \\ \hline 5 \\ 5 \\ \hline 5 \hline$	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw}_2_3{5}\\ 63\% \\ \hline 60\% \\ 55\% \\ \hline 55\% \\ 55\% \\ 55\% \\ \hline 59\% \\ \hline 59\% \end{array}$	97% 93% ip g sw 52% 70% 62% 54% 79% 73% 52%	57% 50% ip 2-g 52% 58% 59% 52% 54% 52% 58% 59% 54% 53% <	96% 93% ip sw_2-g 52% 52% 55% 55% 84% 73% 52%	96% 93% ip 52% 76% 59% 54% 83% 73% 52%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	47% 57% 60% t w/ s sw 99% 95% 59% 53% 79% 53% 60% 100%	53% 53% 53% t w/ s 2-g 50% 71% 63% 54% 51% 60% 57% 72%	57% 61% sw_2-g 59% 63% 62% 53% 59% 59% 100%	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline {\bf t} \ {\bf w} / \ {\bf s} \\ \hline {\bf sw} _ 2_3-{\bf g} \\ 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 59\% \\ \hline 59\% \\ \hline 100\% \end{array}$	97% 93% ip 52% 52% 70% 62% 54% 79% 73% 52% 78%	57% 50% ip 2-g 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.52% 5.68% 5.25% 6.63% 5.72%	96% 93% ip 52% 52% 55% 55% 55% 584% 573% 552% 552% 552%	96% 93% ip sw_2_3-; 52% 76% 59% 54% 83% 73% 52% 75%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	47% 57% 60% t w/ s sw 99% 53% 53% 79% 53% 60% 100% 68%	53% 53% 53% t w/ s 2-g 50% 71% 63% 51% 60% 57% 72% 63%	57% 61% s tw/s s sw_2sg 59% 63% 62% 53% 59% 53% 59% 53% 59% 53% 59% 63% 62% 53% 59% 53% 59% 53% 59% 63% 67% 67%	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	97% 93% ip g sw 52% 70% 62% 54% 79% 73% 52% 78% 75%	57% 50% ip 2-g 52% 58% 59% 54% 52% 58% 52% 54% 52% 54% 52% 54% 52% 54% 52% 54% 52% 54% 52% 54% 54% 52% 54% 52% 54% 52% 54% <	96% 93% ip :sw_2-g :52% :52% :55% :55% :55% :52% :53%	96% 93% ip sw_2_3-; 52% 76% 59% 54% 83% 73% 52% 75% 53%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	47% 57% 60% t w/ s sw 99% 59% 53% 53% 60% 100% 68% 83%	53% 53% 53% t w/s 2-g 50% 71% 63% 54% 51% 60% 57% 63% 58%	57% 61% s t w/ s s sw_2-g 59% 63% 62% 53% 59% 53% 59% 67% 67% 74%	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2} \ 3\text{-}\mathbf{g} \\ 59\% \\ \hline 63\% \\ \hline 60\% \\ 53\% \\ \hline 59\% \\ \hline 53\% \\ \hline 59\% \\ \hline 59\% \\ \hline 67\% \\ \hline 58\% \end{array}$	97% 93% ip g sw 52% 70% 62% 62% 73% 73% 73% 73% 73% 73% 75% 76%	57% 50% ip 2-g 52% 58% 59% 54% 52% 668% 668% 668% 663% 72% 52%	96% 93% ip sw_2-g 52% 52% 55% 55% 54% 73% 52% 53% 63% 73% 53% 53% 53% 53% 57%	96% 93% ip sw_2 3- 52% 76% 54% 83% 73% 52% 75% 53% 74%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	$\begin{array}{c c} & 47\% \\ & 57\% \\ \hline & 60\% \\ \hline {\bf t} ~ {\bf w}/~{\bf s} \\ & {\bf sw} \\ 99\% \\ 55\% \\ 55\% \\ 79\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \end{array}$	53% 53% 53% t w/ s 2-g 50% 71% 63% 51% 60% 57% 72% 63% 58% 68%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\\hline 61\% \\\hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\\hline \mathbf{s} \ \mathbf{w} 2 \ 3 - \mathbf{g} \\\hline 59\% \\\hline 60\% \\\hline 53\% \\\hline 59\% \\\hline 53\% \\\hline 59\% \\\hline 100\% \\\hline 67\% \\\hline 58\% \\\hline 72\% \end{array}$	97% 93% ip 3% 52% 70% 62% 54% 79% 73% 52% 73% 73% 75% 75% 75% 75% 76% 71%	57% 50% ip 2-g 52% 52% 558% 558% 558% 558% 558% 568% 568% 568% 568% 568% 568% 568% 568% 568% 568% 568% 568% 568% 558	96% 93% ip sw_2rg 5 52% 559% 558% 6 52% 528%	96% 93% ip sw_2_3- 52% 76% 59% 54% 83% 73% 52% 75% 73% 73% 74% 70%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	$\begin{array}{c c} & 47\% \\ & 57\% \\ \hline & 60\% \\ \hline & t \ w/ \ s \\ & sw \\ 99\% \\ 55\% \\ 55\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ \end{array}$	53% 53% 53% 53% t w/s 2-g 50% 71% 63% 51% 60% 57% 72% 63% 58% 37%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{s} \ \mathbf{w} _ 2 \ 3 - \mathbf{g} \\ 59\% \\ \hline 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 53\% \\ \hline 59\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \end{array}$	97% 93% ip 52% 70% 62% 73% 52% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73	57% 50% ip 2-g 52% 58% 55% 58% 55% 658% 55% 658% 659% 659% 667% 52% 54% 55% 52% 54% 55% 54% 55% 54% 53% 53%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	96% 93% ip sw_2_3-; 52% 76% 59% 54% 83% 73% 52% 76% 59% 54% 83% 73% 52% 73% 52% 75% 53% 74% 70% 51%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	$\begin{array}{c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ 99\% \\ 95\% \\ 55\% \\ 55\% \\ 53\% \\ 60\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ 75\% \\ 97\% \\ 73\% \\ \end{array}$	53% 53% 53% 53% tw/s 2-g 50% 71% 63% 51% 60% 51% 60% 57% 72% 63% 58% 63% 58% 68% 37% 53%	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline 61\% \\ \hline 8 \\ \hline 8 \\ \hline 8 \\ \hline 8 \\ \hline 9 \hline$	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} _ 2 \ 3 - \mathbf{g} \\ 59\% \\ \hline 63\% \\ \hline 59\% \\ \hline 53\% \\ \hline 59\% \\ \hline 53\% \\ \hline 59\% \\ \hline 59\% \\ \hline 67\% \\ \hline 67\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \end{array}$	97% 93% ip 52% 52% 70% 62% 52% 73% 52% 73% 52% 75% 75% 76% 71% 53% 53%	57% 50% ip 2-g 52% 55% 55% 55% 55% 55% 56% 52% 52% 52% 52% 54% 52% 54% 52% 53% 53% 53%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 96\% \\ \hline 93\% \\ \hline ip \\ sw_2 3-; \\ 52\% \\ \hline 76\% \\ 59\% \\ 54\% \\ 83\% \\ \hline 73\% \\ 52\% \\ 54\% \\ \hline 75\% \\ 53\% \\ \hline 74\% \\ 70\% \\ 51\% \\ 54\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	$\begin{array}{c c} & 47\% \\ & 57\% \\ & 60\% \\ \hline \\ t \ w/ \ s \\ & sw \\ 99\% \\ 55\% \\ 55\% \\ 53\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 49\% \\ \end{array}$	53% 53% 53% 53% 53% 2-g 30% 71% 63% 54% 60% 57% 72% 68% 37% 53% 47%	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline 61\% \\ \hline 8 \\ \hline 9 \\ \hline 9 \\ \hline 6 \\ 2 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5$	$\begin{array}{c c} 57\% \\\hline 61\% \\\hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\\hline \mathbf{s} \ \mathbf{w} 2 \ 3 - \mathbf{g} \\\hline 59\% \\\hline 60\% \\\hline 60\% \\\hline 53\% \\\hline 59\% \\\hline 53\% \\\hline 59\% \\\hline 100\% \\\hline 67\% \\\hline 67\% \\\hline 67\% \\\hline 72\% \\\hline 42\% \\\hline 48\% \end{array}$	97% 93% ip 52% 70% 62% 73% 73% 73% 73% 73% 73% 75% 75% 75% 75% 75% 75% 75% 74% 74% 74% 74% 74% 75% 75% 74% 74% 74% 74% 74% 74% 74% 74% 74% 74	57% 50% ip 2-g 52% 58% 59% 54% 54% 52% 52% 52% 52% 52% 53% 53% 53% 53% 53% 53% 53% 53	96% 93% ip sw_2-g 5 52% 53% 5 53% 53% 53% 53% 53% 53% 53% 51% 54% 70% 51% 54% 40%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain	$\begin{array}{c c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ 99\% \\ 99\% \\ 95\% \\ 53\% \\ 53\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ 73\% \\ 49\% \\ 61\% \\ 54\% \\ 63\% \\ 99\% \\ 99\% \\ 99\% \\ 98\% \\ 93\% \\ 51\% \\ \end{array}$	53% 53% 53% 53% 53% 2-g 50% 71% 63% 51% 60% 51% 60% 51% 60% 57% 53% 60% 53% 63% 53% 68% 56% 59% 51% 60% 52% 73% 60% 59%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{s} \ \mathbf{w} _ 2 \ 3 - \mathbf{g} \\ 59\% \\ \hline 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 53\% \\ \hline 59\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 42\% \\ \hline 77\% \\ \hline 48\% \\ \hline 86\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 52\% \\ \hline 61\% \\ 58\% \\ \end{array}$	97% 93% ip 3 sw 52% 70% 62% 54% 79% 73% 73% 73% 73% 75% 76% 75% 76% 75% 76% 75% 75% 76% 75% 53% 53% 53% 53% 53% 53% 53% 5	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ sw \\ 99\% \\ 95\% \\ 55\% \\ 55\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ 97\% \\ 97\% \\ 61\% \\ 61\% \\ 61\% \\ 61\% \\ 61\% \\ 54\% \\ 61\% \\ 51\% \\ 99\% \\ 99\% \\ 93\% \\ 51\% \\ 100\% \\ 100\% \\ \end{array}$	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 1 w/s$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline t w/s \\ \hline sw_2_35 \\ 59\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 44\% \\ \hline 58\% \\ \hline 72\% \\ \hline 72\% \\ \hline 61\% \\ \hline 86\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 52\% \\ \hline 73\% \\ \hline 61\% \\ \hline 81\% \\ \hline 81\% \\ \hline \end{array}$	97% 93% ip 3% 52% 70% 62% 54% 79% 73% 52% 75% 75% 75% 75% 75% 76% 76% 76% 76% 76% 76% 76% 76% 75% 75% 76% 75% 76% 75% 53% 53% 53% 53% 53% 85% 88%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	96% 93% ip sw_2-g 5 52% 559% 53% 53% 53% 6 73% 552% 53% 6 73% 552% 6 73% 552% 6 70% 51% 6 6 6 6 6 6 6 63% 5 5 63% 5 5 5 5 5 60% 5 5 79%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ sw \\ 99\% \\ 55\% \\ 55\% \\ 79\% \\ 53\% \\ 60\% \\ 100\% \\ 83\% \\ 75\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 61\% \\ 63\% \\ 99\% \\ 100\% \\ 51\% \\ 98\% \\ 93\% \\ 51\% \\ 100\% \\ 81\% \end{array}$	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 1 w/s\\ 2 - g\\ 50\%\\ \hline 71\%\\ \hline 50\%\\ \hline 71\%\\ \hline 51\%\\ \hline 60\%\\ \hline 51\%\\ \hline 72\%\\ \hline 63\%\\ \hline 57\%\\ \hline 72\%\\ \hline 63\%\\ \hline 57\%\\ \hline 72\%\\ \hline 63\%\\ \hline 58\%\\ \hline 58\%\\ \hline 58\%\\ \hline 59\%\\ \hline 51\%\\ \hline 97\%\\ \hline 52\%\\ \hline 60\%\\ \hline 59\%\\ \hline 60\%\\ \hline 67\%\\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline t w/s \\ \hline sw_2 3-\epsilon \\ 59\% \\ \hline 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 50\% \\ \hline 53\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 42\% \\ \hline 77\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 72\% \\ \hline 61\% \\ \hline 58\% \\ \hline 58\% \\ \hline 51\% \\ \hline 51\% \\ \end{array}$	97% 93% ip g sw 52% 70% 62% 70% 73% 52% 73% 52% 73% 75% 76% 75% 76% 75% 76% 75% 76% 75% 76% 75% 76% 75% 75% 75% 75% 75% 51% 51% 51% 52% 52% 59% 53% 81% 81% 53%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ sw \\ 99\% \\ 55\% \\ 55\% \\ 79\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ 73\% \\ 49\% \\ 61\% \\ 54\% \\ 63\% \\ 99\% \\ 100\% \\ 51\% \\ 98\% \\ 98\% \\ 98\% \\ 51\% \\ 100\% \\ 81\% \\ 57\% \\ \end{array}$	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 1\%\\ 2 \text{-g}\\ 50\%\\ \hline 71\%\\ \hline 60\%\\ \hline 51\%\\ \hline 60\%\\ \hline 57\%\\ \hline 63\%\\ \hline 57\%\\ \hline 63\%\\ \hline 57\%\\ \hline 63\%\\ \hline 57\%\\ \hline 57\%\\ \hline 57\%\\ \hline 57\%\\ \hline 51\%\\ \hline 59\%\\ \hline 59\%\\ \hline 59\%\\ \hline 59\%\\ \hline 60\%\\ \hline 67\%\\ \hline 65\%\\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} _ 2_3{\mathbf{f}} \\ 59\% \\ \hline 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 58\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 42\% \\ \hline 77\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 77\% \\ \hline 61\% \\ \hline 58\% \\ \hline 99\% \\ \hline 99\% \\ \hline 52\% \\ \hline 61\% \\ \hline 58\% \\ \hline 81\% \\ \hline 51\% \\ \hline 56\% \\ \hline \end{array}$	97% 93% ip 3 \$w 52% 70% 62% 54% 79% 73% 79% 73% 75% 76% 75% 76% 75% 76% 75% 75% 76% 75% 52% 53% 53% 53% 53% 53% 53% 53% 53	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ 99\% \\ 95\% \\ 55\% \\ 55\% \\ 53\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ 75\% \\ 97\% \\ 75\% \\ 97\% \\ 73\% \\ 49\% \\ 61\% \\ 54\% \\ 63\% \\ 99\% \\ 93\% \\ 51\% \\ 100\% \\ 81\% \\ 57\% \\ 63\% \\ \end{array}$	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 2 \\ \hline 2 \\ \hline 2 \\ \hline 50\%\\ \hline 71\%\\ \hline 60\%\\ \hline 51\%\\ \hline 60\%\\ \hline 51\%\\ \hline 60\%\\ \hline 51\%\\ \hline 60\%\\ \hline 53\%\\ \hline 63\%\\ \hline 63\%\\ \hline 58\%\\ \hline 63\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 57\%\\ \hline 59\%\\ \hline 52\%\\ \hline 59\%\\ \hline 52\%\\ \hline 56\%\\ \hline 67\%\\ \hline 65\%\\ \hline 65\%\\ \hline 65\%\\ \hline 65\%\\ \hline 56\%\\ \hline 50\%\\ \hline 50\%$ \hline 50\% \hline 50\%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} _ 2_3- \mathbf{g} \\ 59\% \\ \hline 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 53\% \\ \hline 59\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 42\% \\ \hline 77\% \\ \hline 48\% \\ \hline 86\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 52\% \\ \hline 61\% \\ \hline 61\% \\ \hline 58\% \\ \hline 61\% \\ \hline 63\% \\ \hline 63\% \\ \hline \end{array}$	97% 93% 93% 93% 52% 70% 62% 70% 73% 75% 76% 75% 76% 71% 53% 51% 52% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ 99\% \\ 95\% \\ 55\% \\ 55\% \\ 53\% \\ 60\% \\ 100\% \\ 83\% \\ 75\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 61\% \\ 61\% \\ 61\% \\ 61\% \\ 61\% \\ 51\% \\ 99\% \\ 51\% \\ 100\% \\ 81\% \\ 57\% \\ 63\% \\ 99\% \\ \end{array}$	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 1\%\\ \hline 2 \text{-g}\\ 50\%\\ \hline 71\%\\ \hline 63\%\\ \hline 54\%\\ \hline 51\%\\ \hline 60\%\\ \hline 57\%\\ \hline 72\%\\ \hline 63\%\\ \hline 57\%\\ \hline 72\%\\ \hline 68\%\\ \hline 68\%\\ \hline 58\%\\ \hline 59\%\\ \hline 51\%\\ \hline 97\%\\ \hline 59\%\\ \hline 51\%\\ \hline 97\%\\ \hline 59\%\\ \hline 51\%\\ \hline 60\%\\ \hline 59\%\\ \hline 56\%\\ \hline 67\%\\ \hline 65\%\\ \hline 66\%\\ \hline 56\%\\ \hline$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{s} \ \mathbf{w} _ 2 _ 3 - \mathbf{g} \\ 59\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 53\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 44\% \\ \hline 77\% \\ \hline 44\% \\ \hline 58\% \\ \hline 99\% \\ \hline 52\% \\ \hline 73\% \\ \hline 61\% \\ \hline 61\% \\ \hline 63\% \\ \hline 63\% \\ \hline 61\% \\ \hline 63\% \\ \hline 63\% \\ \hline \end{array}$	97% 93% ip g sw 52% 70% 62% 52% 70% 62% 73% 52% 73% 52% 75% 75% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 75% 75% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 96\% \\ \hline 993\% \\ \hline 1p \\ sw_2_3-, \\ 52\% \\ \hline 59\% \\ 54\% \\ 83\% \\ 73\% \\ 52\% \\ 75\% \\ 53\% \\ 52\% \\ 75\% \\ 53\% \\ 52\% \\ 74\% \\ 63\% \\ 52\% \\ 54\% \\ 60\% \\ 52\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 68\% \\ 68\% \\ 68\% \\ 68\% \\ 68\% \\ \hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} 47\% \\ 57\% \\ 60\% \\ \hline t w/s \\ 99\% \\ 95\% \\ 59\% \\ 53\% \\ 79\% \\ 53\% \\ 60\% \\ 100\% \\ 68\% \\ 83\% \\ 75\% \\ 97\% \\ 73\% \\ 49\% \\ 61\% \\ 54\% \\ 63\% \\ 99\% \\ 90\% \\ 51\% \\ 100\% \\ 81\% \\ 57\% \\ 63\% \\ \end{array}$	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 2 \\ \hline 2 \\ \hline 2 \\ \hline 50\%\\ \hline 71\%\\ \hline 60\%\\ \hline 51\%\\ \hline 60\%\\ \hline 51\%\\ \hline 60\%\\ \hline 51\%\\ \hline 60\%\\ \hline 53\%\\ \hline 63\%\\ \hline 63\%\\ \hline 58\%\\ \hline 63\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 57\%\\ \hline 59\%\\ \hline 52\%\\ \hline 59\%\\ \hline 52\%\\ \hline 56\%\\ \hline 67\%\\ \hline 65\%\\ \hline 65\%\\ \hline 65\%\\ \hline 65\%\\ \hline 56\%\\ \hline 50\%\\ \hline 50\%$ \hline 50\% \hline 50\%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 57\% \\ \hline 61\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} _ 2_3- \mathbf{g} \\ 59\% \\ \hline 63\% \\ \hline 60\% \\ \hline 53\% \\ \hline 59\% \\ \hline 53\% \\ \hline 59\% \\ \hline 59\% \\ \hline 100\% \\ \hline 67\% \\ \hline 67\% \\ \hline 72\% \\ \hline 42\% \\ \hline 77\% \\ \hline 42\% \\ \hline 77\% \\ \hline 48\% \\ \hline 86\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 52\% \\ \hline 61\% \\ \hline 61\% \\ \hline 58\% \\ \hline 61\% \\ \hline 63\% \\ \hline 63\% \\ \hline \end{array}$	97% 93% 93% 93% 52% 70% 62% 70% 73% 75% 76% 75% 76% 71% 53% 51% 52% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53% 53%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$

Table C.14: Per level and query weighted precision when using MBHA benchmarks for both.

	t	t	t	t	s	s	s	s
Dataset (Query		2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	76%	75%	81%	64%	80%	79%	80%	61%
Adnan Ibrahim		76%	73%	82%	87%	80%	85%	83%
Amman	70%	70%	70%	70%	89%	76%	81%	81%
Jarrar	66%	75%	80%	80%	61%	76%	81%	81%
Alishaa'	54%	54%	54%	54%	74%	54%	74%	74%
Nahawnd	55%	54%	55%	55%	88%	66%	84%	84%
Qersh	86%	76%	78%	78%	55%	71%	50%	50%
Asia	90%	79%	88%	88%	93%	81%	82%	81%
Shir (Shi3r)	84%	81%	82%	82%	80%	76%	77%	80%
Arafat	76%	75%	78%	78%	63%	78%	68%	68%
Cameron	81%	75%	66%	66%	81%	78%	81%	82%
Maliki	53%	65%	70%	70%	45%	45%	44%	44%
Bagara	57%	57%	57%	57%	72%	76%	79%	79%
Sakhr	60%	50%	59%	58%	86%	79%	85%	85%
Iqteran	82%	79%	79%	79%	82%	77%	88%	77%
Aziz	56%	56%	56%	56%	79%	82%	78%	91%
Ahram	73%	54%	54%	54%	97%	78%	96%	96%
Jalamah	79%	68%	76%	87%	68%	69%	85%	85%
Malek Abdullal		59%	61%	90%	98%	99%	99%	98%
Jamaa Arabiya		59% 54%	61% 54%	90% 54%	98% 88%	99% 91%	99% 91%	98%
U								
Sakakini	77%	77%	77%	77%	98%	81%	98%	81%
Bursa	67%	67%	67%	67%	95%	78%	94%	93%
Ain	77%	69%	75%	77%	78%	54%	79%	79%
Thaheryah	58%	76%	78%	78%	76%	77%	66%	79%
Tarablus	60%	79%	77%	77%	89%	55%	85%	77%
Azhar	67%	76%	67%	67%	60%	71%	55%	55%
Arabiyah	78%	75%	78%	78%	82%	78%	77%	77%
Asad	0.407	4.404	0.007	75%	45%	36%	57%	85%
Asau	64%	44%	69%	1370	43%	30/0	3170	
	64%	44%	69% 77%	75%	$\frac{45\%}{97\%}$	72%	96%	
Athraa'	77%	76%	77%	77%	97%	72%	96%	96%
	77% 78%	76% 76%	77% 75%	77% 75%	97% 94%	72% 50%	96% 94%	96% 94%
Athraa' Qedra	77% 78% tw/s	76% 76% tw/s	77% 75% s t w/ s	77% 75% tw/s	97% 94% ip	72% 50% ip	96% 94% ip	96% 94% ip
Athraa' Qedra Dataset (Query)	77% 78% tw/s sw	76% 76% tw/s 2-g	77% 75% s t w/ s sw_2-g	77% 75% tw/s sw_2_3-g	97% 94% j ip g sw	72% 50% ip 2-g	96% 94% ip sw_2-g	96% 94% ip sw_2_3-;
Athraa' Qedra Dataset (Query) Amazon	77% 78% t w/ s sw 99%	76% 76% t w/ s 2-g 50%	77% 75% s t w/ s sw_2-g 78%	77% 75% t w/ s sw_2_3- ₈ 78%	97% 94% ip g sw 75%	72% 50% ip 2-g 575%	96% 94% ip sw_2-g 75%	96% 94% ip sw_2_3 - 75%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	77% 78% t w/ s 99% 95%	76% 76% t w/ s 2-g 50% 82%	77% 75% s t w/ s sw_2-g 78% 76%	77% 75% t w/ s sw_2_3- 78% 76%	97% 94% ip g sw 75% 78%	72% 50% ip 2-g 75% 64%	96% 94% ip sw_2-g 75% 54%	96% 94% ip sw_2_3 - 75% 84%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	77% 78% t w/ s sw 99% 95% 69%	76% 76% t w/s 2-g 50% 82% 72%	77% 75% s t w/ s sw_2-g 78% 76% 71%	77% 75% t w/ s sw_2_3- 78% 76% 76% 70%	97% 94% ip g sw 75% 78% 64%	72% 50% ip 2-g 75% 64% 78%	96% 94% ip sw_2-g 75% 54% 62%	96% 94% ip sw_2_3- 75% 84% 62%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	77% 78% t w/s sw 99% 95% 69% 61%	76% 76% t w/ s 2-g 50% 82% 72% 76%	77% 75% 5 t w/ s sw_2-g 78% 76% 71% 61%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline sw_2_3{1}\\ 78\% \\ 76\% \\ 76\% \\ 70\% \\ 61\% \end{array}$	97% 94% ip g sw 75% 78% 64% 76%	72% 50% ip 2-g 50% 64% 78% 76%	$\begin{array}{c c} 96\% \\ \hline 94\% \\ \hline \\ $ sw_2-g \\ $ 54\% \\ $ 54\% \\ $ 62\% \\ $ 76\% \\ \hline \end{array}$	96% 94% ip sw_2_3- 75% 84% 62% 76%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	77% 78% t w/ s sw 99% 95% 69% 61% 85%	76% 76% tw/s 2-g 50% 82% 72% 76% 54%	77% 75% s t w/s sw_2-g 78% 76% 71% 61% 78%	77% 75% t w/s sw_2_3- 78% 76% 70% 61% 78%	97% 94% ip g sw 75% 78% 64% 76% 81%	72% 50% ip 2-g 50% 64% 75% 64% 76% 75%	$\begin{array}{c c} 96\% \\ \hline 94\% \\ \hline 100 \\ sw_2-g \\ 5 \\ 75\% \\ 5 \\ 5 \\ 5 \\ 6 \\ 62\% \\ 6 \\ 62\% \\ 6 \\ 87\% \\ \end{array}$	96% 94% ip sw_2_3- 75% 84% 62% 76% 86%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	$\begin{array}{c c} 77\% \\ 78\% \\ \hline t w/s \\ sw \\ 99\% \\ 95\% \\ 69\% \\ 61\% \\ 85\% \\ 55\% \\ \end{array}$	76% 76% tw/s 2-g 50% 82% 72% 76% 54% 67%	77% 75% stw/s sw_2-g 78% 76% 71% 61% 78% 55%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline \mathbf{t w/s} \\ \mathbf{sw}_2_3{t} \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 78\% \\ \hline 55\% \end{array}$	97% 94% ip g sw 75% 78% 64% 76% 81% 82%	72% 50% ip 2-g 50% 64% 75% 64% 76% 75% 81%	96% 94% ip sw_2-g 54% 62% 76% 87% 83%	96% 94% sw_2 3-, 75% 84% 62% 76% 86% 86% 83%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	77% 78% t w/ s sw 99% 95% 69% 61% 85% 55% 78%	76% 76% tw/s 2-g 50% 82% 72% 76% 54% 67% 77%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline s & t w/s \\ \hline sw_2-g \\ 78\% \\ \hline 76\% \\ \hline 76\% \\ \hline 71\% \\ \hline 61\% \\ \hline 61\% \\ \hline 55\% \\ \hline 78\% \\ \hline \end{array}$	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline \mathbf{x} \mathbf{w} \mathbf{s} \\ \mathbf{sw} \underline{2} 3 \mathbf{-} \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 78\% \end{array}$	97% 94% ip g sw 75% 78% 64% 76% 81% 82% 75%	72% 50% ip 2-g 5 64% 75% 64% 76% 75% 81% 79%	96% 94% ip sw_2-g 5 54% 62% 76% 87% 83% 75%	96% 94% ip sw_2_3- 75% 84% 62% 86% 83% 75%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	77% 78% t w/ s sw 99% 95% 69% 61% 85% 55% 78% 100%	76% 76% t w/ s 2-g 50% 82% 76% 54% 67% 77% 82%	77% 75% s t w/s sw_2-g 78% 76% 71% 61% 78% 55% 78% 100%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline {\bf t w/s} \\ {\bf sw_2 _3-}_4 \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 78\% \\ \hline 78\% \\ \hline 100\% \end{array}$	97% 94% ip g sw 75% 78% 64% 76% 81% 82% 75% 84%	72% 50% ip 2-g 5 64% 75% 64% 76% 81% 79% 82%	96% 94% ip sw_2-g 54% 6 75% 87% 83% 75% 84%	96% 94% ip sw_2_3- 75% 84% 62% 76% 86% 83%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	77% 78% t w/ s sw 99% 95% 69% 61% 85% 55% 78% 100% 81%	76% 76% t w/ s 2-g 50% 82% 76% 54% 67% 77% 82% 79%	77% 75% stw_ssw_2-g 76% 76% 61% 78% 55% 8% 55% 78% 78% 80%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline {\bf t w/s} \\ sw_2 3-i \\ 78\% \\ \hline 76\% \\ \hline 76\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \end{array}$	97% 94% ip g sw 75% 64% 76% 81% 82% 75% 84% 83%	72% 50% ip 2-g 50% 64% 75% 64% 76% 76% 75% 81% 82% 82%	96% 94% ip sw_2:g 5 75% 54% 62% 676% 83% 75% 84% 684% 684%	96% 94% ip sw_2_3- 75% 84% 62% 76% 83% 76%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 2-g 50% 82% 72% 76% 54% 67% 82% 79% 69%	77% 75% s tw/s sw_2-g 78% 61% 78% 55% 78% 100% 80% 79%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline \mathbf{t w/s} \\ sw_2 3{t} \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \\ \hline 68\% \end{array}$	97% 94% ip g sw 75% 78% 64% 81% 82% 75% 84% 84% 83%	72% 50% ip 2-g 6 75% 6 78% 76% 75% 81% 6 79% 82% 59%	96% 94% ip sw_2-g 75% 54% 62% 87% 83% 75% 83% 75% 84% 76% 84%	96% 94% ip sw_2_3- 75% 84% 62% 76% 86% 83% 76% 83%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	77% 78% tw/s sw 99% 95% 69% 61% 55% 78% 100% 81% 86% 82%	76% 76% 2-g 50% 2-g 50% 82% 72% 76% 54% 67% 77% 82% 69% 80%	77% 75% stw/s sw_2sg 78% 71% 61% 78% 55% 78% 100% 80% 70% 81%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ sw_2 3-4 \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 55\% \\ 55\% \\ \hline 78\% \\ \hline 100\% \\ 80\% \\ \hline 88\% \\ \hline 82\% \\ \end{array}$	97% 94% ip g sw 75% 78% 64% 81% 82% 84% 83% 84% 84% 82%	72% 50% ip 2-g 6 75% 6 75% 6 76% 75% 6 75% 6 75% 6 75% 6 75% 6 75% 81% 79% 82% 6 59% 56%	96% 94% ip sw_2-g 5 75% 5 54% 6 62% 76% 83% 75% 83% 75% 84% 76% 84% 6 84% 6 84% 6 81%	96% 94% ip sw_2_3- 75% 84% 62% 76% 83% 76% 83% 83% 83% 83% 83% 83% 83%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 2-g 50% 82% 72% 76% 54% 72% 76% 54% 72% 76% 54% 69% 80% 44%	77% 75% stw/s sw_2-g 78% 76% 61% 78% 55% 78% 78% 78% 78% 78% 78% 78% 80% 79% 81% 42%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline {\bf t w/s} \\ sw_2 \\ 3^{-}4 \\ 78\% \\ \hline 76\% \\ 70\% \\ 61\% \\ 78\% \\ \hline 55\% \\ 55\% \\ \hline 78\% \\ 100\% \\ 80\% \\ \hline 88\% \\ 68\% \\ 82\% \\ 42\% \end{array}$	97% 94% ip g sw 75% 64% 76% 81% 82% 75% 82% 82% 82% 83% 83% 83%	72% 50% ip 2-g 50% 675% 64% 76% 76% 81% 79% 82% 55% 55% 44%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	96% 94% ip sw_2_3- 75% 84% 62% 76% 83% 75% 83% 75% 83% 76% 83% 76% 83% 76% 83% 76% 83% 76% 83% 76% 81% 62%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	77% 78% tw/s sw 99% 95% 69% 61% 55% 78% 100% 81% 86% 82%	76% 76% 2-g 50% 2-g 50% 82% 72% 76% 54% 67% 77% 82% 69% 80%	77% 75% stw/s sw_2sg 78% 71% 61% 78% 55% 78% 100% 80% 70% 81%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ sw_2 3-4 \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 55\% \\ 55\% \\ \hline 78\% \\ \hline 100\% \\ 80\% \\ \hline 88\% \\ \hline 82\% \\ \end{array}$	97% 94% ip g sw 75% 78% 64% 81% 82% 84% 83% 84% 82%	72% 50% ip 2-g 50% 675% 64% 76% 76% 81% 79% 82% 55% 55% 44%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	96% 94% ip sw_2_3- 75% 84% 62% 76% 83% 76% 83% 83% 83% 83% 83% 83% 83%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	77% 78% sw/s 99% 95% 69% 61% 85% 55% 78% 100% 81% 86% 82% 97%	76% 76% 76% 2-g 50% 82% 72% 76% 54% 72% 76% 54% 72% 76% 54% 69% 80% 44%	77% 75% sw_2sg 78% 76% 61% 78% 55% 78% 78% 78% 78% 78% 78% 78% 78% 78% 78% 78% 78% 78% 78% 80% 81% 42%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline {\bf t w/s} \\ sw_2 \\ 3^{-}4 \\ 78\% \\ \hline 76\% \\ 70\% \\ 61\% \\ 78\% \\ \hline 55\% \\ 55\% \\ \hline 78\% \\ 100\% \\ 80\% \\ \hline 88\% \\ 68\% \\ 82\% \\ 42\% \end{array}$	97% 94% ip g sw 75% 64% 76% 81% 82% 75% 82% 82% 82% 83% 83% 83%	72% 50% ip 2-g 6 75% 6 78% 77% 6 78% 77% 81% 82% 59% 55% 44% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	96% 94% ip sw_2_3- 75% 84% 62% 76% 83% 75% 83% 75% 83% 76% 83% 76% 83% 76% 83% 76% 83% 76% 83% 76% 81% 62%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	77% 78% t w/ s sw 99% 95% 69% 61% 55% 78% 100% 81% 86% 82% 97% 78%	76% 76% 76% 1 w/s 2-g 50% 82% 72% 54% 67% 79% 69% 80% 44% 57%	77% 75% stw_set stw_set 75% stw_set 75% stw_set 76% 71% 61% 78% 55% 78% 78% 78% 80% 79% 81% 42% 81%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline \mathbf{t w/s} \\ sw_2 3-i \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \\ \hline 68\% \\ \hline 82\% \\ \hline 42\% \\ \hline 81\% \end{array}$	97% 94% ip g sw 75% 64% 76% 81% 82% 75% 84% 83% 84% 83% 84% 83% 86%	72% 50% ip 2-g 75% 64% 78% 81% 75% 81% 82% 59% 56% 76% 59% 59% 76% 59% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	96% 94% ip sw_2_3- 75% 84% 62% 76% 83% 76% 83% 76% 83% 76% 83% 76% 62% 76%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	77% 78% sw/s 99% 95% 69% 61% 85% 78% 100% 81% 86% 82% 97% 78% 62% 75%	$\begin{array}{c c} 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 2 \text{-g} \\ 50\% \\ \hline 82\% \\ \hline 72\% \\ \hline 76\% \\ \hline 54\% \\ \hline 67\% \\ \hline 77\% \\ \hline 69\% \\ \hline 80\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 77\% \\ \hline \end{array}$	77% 75% sw_2sg 78% 71% 61% 78% 78% 78% 78% 78% 78% 78% 78% 78% 80% 79% 81% 42% 61% 82%	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ sw_2 3-4 \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 78\% \\ \hline 55\% \\ 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \\ \hline 88\% \\ \hline 82\% \\ \hline 42\% \\ \hline 81\% \\ \hline 61\% \\ \hline 77\% \\ \end{array}$	97% 94% ip g sw 75% 78% 64% 81% 82% 75% 84% 83% 84% 83% 82% 35% 68% 41% 83%	72% 50% ip 2-g 64% 75% 64% 78% 78% 78% 78% 78% 75% 81% 59% 59% 59% 59% 78% 78%	96% 94% ip sw_2rg 5 75% 54% 6 62% 6 76% 83% 6 76% 84% 76% 84% 6 84% 63% 76% 81% 63% 76% 81%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 50% 82% 76% 54% 67% 76% 82% 79% 69% 80% 57% 60% 77% 60% 77% 60% 77% 60% 59%	77% 75% sw_2rg sw_2rg 78% 76% 61% 78% 78% 78% 78% 78% 78% 78% 78% 78% 80% 79% 81% 81% 81% 81% 82% 95%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 94% ip g sw 75% 78% 64% 81% 82% 83% 84% 84% 84% 84% 84% 84% 84% 84% 84% 84	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	96% 94% ip sw_2_3- 75% 84% 62% 76% 83% 75% 83% 76% 83% 76% 83% 76% 81% 75%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 50% 82% 72% 67% 76% 67% 76% 67% 76% 60% 80% 44% 57% 60% 77% 59% 77% 77% 59% 77% 78%	77% 75% s t w/ s sw_2-g 76% 71% 61% 78% 55% 100% 80% 79% 81% 61% 81% 61% 82% 95% 60%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 94% ip g sw 75% 78% 64% 76% 81% 82% 75% 84% <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{c c} 96\% \\\hline 96\% \\\hline 94\% \\\hline ip \\sw_2_3. \\\hline 75\% \\\hline 84\% \\\hline 62\% \\\hline 62\% \\\hline 76\% \\\hline 88\% \\\hline 76\% \\\hline 83\% \\\hline 75\% \\\hline 83\% \\\hline 76\% \\\hline 83\% \\\hline 76\% \\\hline 81\% \\\hline 62\% \\\hline 68\% \\\hline 68\% \\\hline \end{array}$</td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 96\% \\\hline 96\% \\\hline 94\% \\\hline ip \\sw_2_3. \\\hline 75\% \\\hline 84\% \\\hline 62\% \\\hline 62\% \\\hline 76\% \\\hline 88\% \\\hline 76\% \\\hline 83\% \\\hline 75\% \\\hline 83\% \\\hline 76\% \\\hline 83\% \\\hline 76\% \\\hline 81\% \\\hline 62\% \\\hline 68\% \\\hline 68\% \\\hline \end{array}$
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	76% 76% 76% 76% 2-g 50% 82% 76% 54% 67% 79% 82% 79% 69% 44% 57% 60% 77% 59% 78% 52%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ sw_2 3-i \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ 80\% \\ \hline 88\% \\ \hline 42\% \\ 81\% \\ \hline 61\% \\ \hline 77\% \\ \hline 81\% \\ \hline 86\% \\ 99\% \\ \end{array}$	97% 94% ip g sw 75% 64% 81% 82% 84% 84% 84% 84% 84% 84% 84% 84% 84% 85% 65%	72% 50% ip 2-gg 75% 64% 76% 81% 678% 82% 556% 556% 78% 552% 555% 78%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 2 \text{-g} \\ 50\% \\ \hline 82\% \\ \hline 72\% \\ \hline 67\% \\ \hline 77\% \\ \hline 67\% \\ \hline 77\% \\ \hline 69\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 80\% \\ \hline 84\% \\ \hline 77\% \\ \hline 59\% \\ \hline 78\% \\ \hline 78\% \\ \hline 52\% \\ \hline 97\% \\ \hline 54\% \\ \hline 60\% \hline \hline 60\% \\ \hline 60\% \hline \hline 60\% \\ \hline 60\% \hline 60\% \hline \hline 60\% \hline$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ sw_2 3-i \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \\ \hline 68\% \\ \hline 82\% \\ \hline 42\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 86\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 54\% \\ \hline 67\% \\ \hline 67\% \\ \hline \end{array}$	97% 94% ip g swu 75% 76% 81% 82% 75% 84% 83% 84% 83% 84% 83% 66% 66% 65% 75% 75% 77%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline {\bf t w/s} \\ \hline sw_2 \\ 3^{-}4 \\ \hline 78\% \\ \hline 78\% \\ \hline 78\% \\ \hline 78\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 78\% \\ \hline 68\% \\ \hline 68\% \\ \hline 68\% \\ \hline 68\% \\ \hline 61\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 88\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 88\% \\ \hline 61\% \\ \hline 67\% \\ \hline 69\% \\ \hline \end{array}$	97% 94% ip g sw 75% 78% 64% 81% 82% 76% 84% 83% 84% 83% 84% 84% 84% 84% 84% 84% 85% 66% 67% 69% 55% 76% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 90\% \hline 90\% \hline 90\% \hline 90\% \\ \hline 90\% \hline$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ 8w_2 \\ -3f_8 \\ \hline 78\% \\ \hline 76\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \\ \hline 80\% \\ \hline 82\% \\ \hline 42\% \\ \hline 42\% \\ \hline 61\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 86\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 54\% \\ \hline 67\% \\ \hline 69\% \\ \hline 86\% \\ \hline \end{array}$	97% 94% ip g sw 75% 76% 84% 82% 75% 84% 82% 35% 68% 84% 82% 35% 68% 68% 75% 75% 75% 75% 75% 75% 75% 75% 75% 84% 83% 84% 83% 84% 83% 85% 84% 85% 85% 86% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qadaa Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jama Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 92 \\ 92 \\ 950\% \\ \hline 82\% \\ \hline 72\% \\ 82\% \\ \hline 76\% \\ \hline 54\% \\ \hline 67\% \\ \hline 77\% \\ \hline 82\% \\ \hline 60\% \\ \hline 80\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 60\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 52\% \\ \hline 97\% \\ \hline 54\% \\ \hline 80\% \\ \hline 77\% \\ \hline 80\% \\ \hline 80\% \\ \hline 80\% \\ \hline 80\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ 8w_2 \\ -36\% \\ \hline 78\% \\ \hline 76\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \\ \hline 88\% \\ \hline 42\% \\ \hline 81\% \\ \hline 61\% \\ \hline 77\% \\ \hline 88\% \\ \hline 61\% \\ \hline 77\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 54\% \\ \hline 82\% \\ \hline 67\% \\ \hline 69\% \\ \hline 69\% \\ \hline 65\% \\ \hline 51\% \\ \end{array}$	97% 94% ip g sw 75% 78% 64% 81% 82% 84% 82% 84% 82% 84% 83% 68% 68% 65% 75% 75% 75% 75% 75% 75% 75% 75% 75% 7	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	77% 78% sw/s 99% 95% 69% 61% 85% 78% 100% 81% 62% 75% 56% 78% 90% 97% 78% 62% 75% 56% 79% 99% 90% 90% 90% 5100% 51% 51% 51% 51% 66%	$\begin{array}{c c} 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 2 \text{-g} \\ 50\% \\ \hline 82\% \\ \hline 72\% \\ \hline 67\% \\ \hline 77\% \\ \hline 69\% \\ \hline 80\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 79\% \\ \hline 59\% \\ \hline 78\% \\ \hline 59\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 60\% \\ \hline 77\% \\ \hline 60\% \\ \hline 77\% \\ \hline 60\% \\ \hline 71\% \\ \hline 77\% \\ \hline 80\% \\ \hline 68\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} _ 2 _ 3 - 4 \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 100\% \\ \hline 80\% \\ \hline 68\% \\ \hline 68\% \\ \hline 68\% \\ \hline 68\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 82\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 82\% \\ \hline 61\% \\ \hline 61\% \\ \hline 77\% \\ \hline 99\% \\ \hline 54\% \\ \hline 69\% \\ \hline 65\% \\ \hline 65\% \\ \hline \end{array}$	97% 94% ip g sw 75% 78% 64% 76% 81% 82% 75% 84% 83% 84% 83% 66% 66% 65% 76% 75% 75% 76% 76% 76% 76% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qadaa Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jama Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 92 \\ 92 \\ 950\% \\ \hline 82\% \\ \hline 72\% \\ 82\% \\ \hline 76\% \\ \hline 54\% \\ \hline 67\% \\ \hline 77\% \\ \hline 82\% \\ \hline 60\% \\ \hline 80\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 60\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 52\% \\ \hline 97\% \\ \hline 54\% \\ \hline 80\% \\ \hline 77\% \\ \hline 80\% \\ \hline 80\% \\ \hline 80\% \\ \hline 80\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline t w/s \\ 8w_2 \\ -36\% \\ \hline 78\% \\ \hline 76\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 55\% \\ \hline 78\% \\ \hline 100\% \\ \hline 80\% \\ \hline 88\% \\ \hline 42\% \\ \hline 81\% \\ \hline 61\% \\ \hline 77\% \\ \hline 88\% \\ \hline 61\% \\ \hline 77\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 54\% \\ \hline 82\% \\ \hline 67\% \\ \hline 69\% \\ \hline 69\% \\ \hline 65\% \\ \hline 51\% \\ \end{array}$	97% 94% ip g sw 75% 78% 64% 81% 82% 84% 82% 84% 82% 84% 83% 68% 68% 65% 75% 75% 75% 75% 75% 75% 75% 75% 75% 7	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	77% 78% sw/s 99% 95% 69% 61% 85% 78% 100% 81% 62% 75% 56% 78% 90% 97% 78% 62% 75% 56% 79% 99% 90% 90% 90% 5100% 51% 51% 51% 51% 66%	$\begin{array}{c c} 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 76\% \\ \hline 2 \text{-g} \\ 50\% \\ \hline 82\% \\ \hline 72\% \\ \hline 67\% \\ \hline 77\% \\ \hline 69\% \\ \hline 80\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 44\% \\ \hline 57\% \\ \hline 60\% \\ \hline 79\% \\ \hline 59\% \\ \hline 78\% \\ \hline 59\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 59\% \\ \hline 77\% \\ \hline 60\% \\ \hline 77\% \\ \hline 60\% \\ \hline 77\% \\ \hline 60\% \\ \hline 71\% \\ \hline 77\% \\ \hline 80\% \\ \hline 68\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 77\% \\ \hline 75\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline \mathbf{sw} _ 2 _ 3 - 4 \\ 78\% \\ \hline 76\% \\ \hline 70\% \\ \hline 61\% \\ \hline 78\% \\ \hline 55\% \\ \hline 100\% \\ \hline 80\% \\ \hline 68\% \\ \hline 68\% \\ \hline 68\% \\ \hline 68\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 61\% \\ \hline 77\% \\ \hline 95\% \\ \hline 82\% \\ \hline 61\% \\ \hline 61\% \\ \hline 77\% \\ \hline 99\% \\ \hline 54\% \\ \hline 69\% \\ \hline 65\% \\ \hline 65\% \\ \hline \end{array}$	97% 94% ip g sw 75% 78% 64% 76% 81% 82% 75% 84% 83% 84% 83% 66% 66% 65% 76% 75% 75% 76% 76% 76% 76% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azia	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	77% 75% sw_2rg sw_2rg 76% 71% 61% 78% 78% 78% 78% 78% 78% 78% 78% 78% 80% 79% 81% 81% 81% 81% 81% 81% 81% 61% 82% 95% 60% 99% 54% 67% 68% 86% 65% 65% 65% 65% 65% 65% 79%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 94% ip g sw 75% 78% 64% 81% 82% 75% 84% 83% 83% 84% 84% 83% 84% 84% 84% 85% 67% 65% 75% 75% 75% 75% 76% 55%	72% 50% ip 2-gg 75% 64% 76% 81% 678% 76% 82% 556% 76% 556% 78% 55% 78% 680% 78% 680% 78% 63% 78% 55% 78% 63% 77% 55% 78% 63% 77% 55% 78% 55% 78% 55% 77% 55% 77% 55% 77% 55% 75% 54% 77% 562% 62% 62% 62% 62% 62% <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{r c c c c c c c c c c c c c c c c c c c$</td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$

C.3.4 Google/BRF

Table C.15: Per level and query macro F-measure when using BRF benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	41%	41%	41%	41%	75%	49%	85%	86%
Adnan Ibrahim	ı 58%	48%	58%	58%	50%	49%	53%	43%
Amman	71%	47%	60%	71%	38%	38%	79%	79%
Jarrar	42%	38%	45%	45%	38%	51%	66%	66%
Alishaa'	47%	40%	47%	45%	66%	44%	93%	54%
Nahawnd	59%	50%	59%	59%	89%	48%	89%	89%
Qersh	38%	52%	39%	43%	50%	50%	50%	50%
Asia	92%	38%	92%	68%	94%	71%	92%	92%
Shir (Shi3r)	92%	42%	81%	81%	76%	47%	71%	79%
Arafat	42%	42%	42%	42%	59%	40%	67%	67%
Cameron	56%	42 % 56%	42%	42% 56%	91%	39%	49%	52%
Maliki								
	44%	21%	56%	65%	30%	30%	42%	42%
Baqara	47%	67%	49%	49%	50%	45%	45%	45%
Sakhr	39%	33%	36%	39%	50%	30%	48%	47%
Iqteran	66%	41%	49%	49%	73%	49%	73%	77%
Aziz	61%	67%	57%	58%	72%	52%	72%	72%
Ahram	49%	38%	49%	49%	78%	40%	87%	87%
Jalamah	43%	38%	43%	43%	63%	56%	63%	63%
Malek Abdullal		93%	93%	92%	97%	92%	93%	92%
Jamaa Arabiya		56%	49%	49%	57%	91%	94%	91%
Sakakini	73%	38%	40%	51%	90%	60%	90%	80%
Bursa	72%	72%	72%	72%	96%	52%	95%	89%
Ain	45%	45%	45%	45%	45%	39%	72%	72%
Thaheryah	47%	54%	47%	47%	59%	40%	94%	94%
Tarablus	49%	49%	49%	49%	51%	52%	51%	51%
Azhar	50%	42%	43%	49%	63%	45%	47%	47%
Arabiyah		38%	52%	51%	45%	45%	44%	45%
	38%							
0	38%							490%
Asad	35%	31%	50%	50%	41%	25%	59%	42%
Asad Athraa'	35% 58%	31% 58%	50% 58%	50% 59%	41% 92%	25% 45%	59% 94%	94%
Asad	35% 58% 57%	31% 58% 40%	50% 58% 89%	50% 59% 88%	41% 92% 44%	25% 45% 45%	59% 94% 44%	$94\% \\ 44\%$
Asad Athraa' Qedra	35% 58% 57% t w/ s	31% 58% 40% t w/ s	50% 58% 89% t w/s	50% 59% 88% tw/s	41% 92% 44% ip	25% 45% 45% ip	59% 94% 44% ip	94% 44% ip
Asad Athraa' Qedra Dataset (Query)	35% 58% 57% t w/ s sw	31% 58% 40% t w/ s 2-g	50% 58% 89% t w/ s sw_2-g	50% 59% 88% t w/ s sw_2_3-a	41% 92% 44% ip g sw	25% 45% 45% ip 2-g	59% 94% 44% ip sw_2-g	94% 44% sw_2_3-
Asad Athraa' Qedra Dataset (Query) Amazon	35% 58% 57% t w/ s sw 96%	31% 58% 40% t w/ s 2-g 49%	50% 58% 89% tw/s sw_2-g 96%	50% 59% 88% tw/s sw_2_3-g 96%	41% 92% 44% ip g sw 38%	25% 45% 45% ip 2-g 5 44%	59% 94% 44% ip sw_2-g 38%	94% 44% ip sw_2_3 - 37%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	35% 58% 57% t w/ s sw 96% 59%	31% 58% 40% t w/ s 2-g 49% 58%	50% 58% 89% t w/ s sw_2-g 96% 58%	50% 59% 88% t w/ s sw_2_3- 96% 58%	41% 92% 44% ip g sw 38% 35%	25% 45% 45% ip 2-g 544% 52%	59% 94% 44% ip sw_2-g 38% 67%	94% 44% ip sw_2_3- 37% 69%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	35% 58% 57% t w/ s sw 96% 59% 97%	31% 58% 40% t w/ s 2-g 49% 58% 67%	50% 58% 89% tw/s sw_2-g 96% 58% 69%	50% 59% 88% t w/ s sw_2_3-8 96% 58% 69%	41% 92% 44% ip g sw 38% 35% 36%	25% 45% 45% 2-g 5 44% 5 52% 5 58%	59% 94% 44% ip sw_2-g 38% 67% 60%	94% 44% ip sw_2_3- 37% 69% 55%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	35% 58% 57% t w/ s sw 96% 59% 97% 99%	31% 58% 40% t w/ s 2-g 49% 58% 67% 44%	50% 58% 89% tw/s sw_2-g 96% 58% 69% 68%	50% 59% 88% t w/ s sw_2_3- 96% 58% 69% 64%	41% 92% 44% ip g sw 38% 35% 36% 77%	25% 45% 45% ip 2-g 5 44% 52% 5 5 5 5 5 71%	59% 94% 44% ip sw_2-g 38% 67% 60% 76%	94% 44% ip sw_2_3- 69% 55% 79%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	35% 58% 57% t w/ s sw 96% 59% 97% 99%	31% 58% 40% t w/ s 2-g 49% 58% 67% 44% 49%	50% 58% 89% t w/s sw_2-g 96% 58% 69% 68% 99%	$\begin{array}{c} 50\% \\ 59\% \\ \hline 88\% \\ \hline {\bf t} \ {\bf w} / \ {\bf s} \\ {\bf sw} _ {\bf 2} _ {\bf 3} - {\bf g} \\ 96\% \\ \hline 58\% \\ \hline 69\% \\ \hline 64\% \\ 99\% \end{array}$	41% 92% 44% ip g sw 38% 35% 36% 77% 37%	25% 45% 45% ip 2-g 5 44% 52% 58% 58% 71% 45%	59% 94% 44% ip sw_2-g 38% 67% 660% 76% 37%	94% 44% ip sw_2_3- 37% 69% 55% 79% 37%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	35% 58% 57% t w/ s sw 96% 59% 97% 99% 99% 61%	31% 58% 40% t w/ s 2-g 49% 58% 67% 44% 49% 45%	50% 58% 89% tw/s sw_2-g 96% 58% 69% 68% 99% 59%	$\begin{array}{c c} 50\% \\ \hline 59\% \\ \hline 88\% \\ \hline {\bf t} {\bf w}/{\bf s} \\ \hline {\bf sw}_2_3-{\bf r} \\ 96\% \\ \hline 58\% \\ \hline 69\% \\ \hline 64\% \\ \hline 99\% \\ \hline 59\% \end{array}$	41% 92% 44% ip g sw 38% 35% 36% 77% 37% 48%	$\begin{array}{c c} 25\% \\ \hline 45\% \\ \hline 45\% \\ \hline \\ \hline 9 \\ 2-g \\ 5 \\ 44\% \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ $	$\begin{array}{c c} 59\% \\ 94\% \\ 44\% \\ \hline \mathbf{ip} \\ \mathbf{sw}_2-\mathbf{g} \\ 0 & 38\% \\ 0 & 67\% \\ 0 & 60\% \\ 0 & 76\% \\ 0 & 37\% \\ 0 & 74\% \end{array}$	94% 44% sw_2_3- 37% 69% 55% 79% 37% 76%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	35% 58% 57% t w/ s sw 96% 59% 97% 99% 61% 53%	31% 58% 40% t w/ s 2-g 49% 58% 67% 44% 49% 45% 40%	$\begin{array}{c c} 50\% \\ \hline 58\% \\ \hline 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 96\% \\ \hline 58\% \\ \hline 69\% \\ \hline 68\% \\ \hline 68\% \\ \hline 69\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 94\% \\ \end{array}$	$\begin{array}{c} 50\% \\ 59\% \\ 88\% \\ \hline t w/s \\ sw_2_3t \\ 96\% \\ 58\% \\ 69\% \\ 64\% \\ 99\% \\ 59\% \\ 53\% \end{array}$	41% 92% 44% ip g sw 38% 35% 36% 77% 37% 48% 86%	$\begin{array}{c c} 25\% \\ \hline 45\% \\ \hline 45\% \\ \hline \\ \hline 9 \\ 2-g \\ 5 \\ 44\% \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ $	$\begin{array}{c c} 59\% \\ \hline 94\% \\ 44\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 0 & 38\% \\ 0 & 67\% \\ 0 & 60\% \\ 0 & 76\% \\ 0 & 37\% \\ 0 & 74\% \\ 0 & 80\% \\ \end{array}$	94% 44% ip 37% 69% 55% 79% 37% 76% 69%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	35% 58% 57% tw/s sw 96% 59% 97% 99% 61% 53% 100%	31% 58% 40% t w/ s 2-g 49% 58% 67% 44% 49% 45% 40% 39%	$\begin{array}{c c} 50\% \\ \hline 50\% \\ \hline 58\% \\ 89\% \\ \hline t w/s \\ sw_2-g \\ 96\% \\ \hline 58\% \\ \hline 69\% \\ 68\% \\ 99\% \\ \hline 59\% \\ 94\% \\ 99\% \end{array}$	$\begin{array}{c c} 50\% \\ \hline 50\% \\ \hline 88\% \\ \hline t w/s \\ sw_2_31 \\ 96\% \\ \hline 58\% \\ 69\% \\ \hline 64\% \\ 99\% \\ \hline 53\% \\ 99\% \end{array}$	41% 92% 44% ip g sw 38% 35% 36% 77% 37% 48% 86% 45%	$\begin{array}{c c} 25\% \\ \hline 45\% \\ \hline 45\% \\ \hline 2-g \\ 5-g \\ 5-g$	$\begin{array}{c c} 59\% \\ \hline 94\% \\ \hline 44\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 0 & 38\% \\ 0 & 67\% \\ 0 & 67\% \\ 0 & 67\% \\ 0 & 37\% \\ 0 & 76\% \\ 0 & 37\% \\ 0 & 80\% \\ 0 & 97\% \\ \end{array}$	94% ip sw_2_3- 37% 69% 79% 37% 69% 97%
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	$\begin{array}{c c} 35\% \\ 58\% \\ 57\% \\ \hline \\ $57\% \\ $96\% \\ 996\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 61\% \\ 53\% \\ 100\% \\ 80\% \\ 97\% \\ 92\% \\ \end{array}$	$\begin{array}{c} 31\% \\ 58\% \\ 40\% \\ \hline \\ \mathbf{t} \ \mathbf{w}/ \ \mathbf{s} \\ 2 \ \mathbf{g} \\ 49\% \\ 58\% \\ 67\% \\ 44\% \\ 49\% \\ 45\% \\ 40\% \\ 39\% \\ 71\% \\ 71\% \\ 49\% \\ 57\% \end{array}$	$\begin{array}{c c} 50\% \\ \hline 50\% \\ \hline 58\% \\ 89\% \\ \hline t w/s \\ sw_2-g \\ 96\% \\ \hline 58\% \\ \hline 69\% \\ \hline 69\% \\ \hline 68\% \\ 99\% \\ \hline 99\% \\ 80\% \\ \hline 76\% \\ 93\% \\ \end{array}$	$\begin{array}{c} 50\% \\ 59\% \\ \hline 88\% \\ \hline t w/s \\ sw_2_3i \\ 96\% \\ 58\% \\ 69\% \\ 64\% \\ 99\% \\ 59\% \\ 55\% \\ 53\% \\ 99\% \\ 82\% \\ 99\% \\ 82\% \\ 96\% \\ 56\% \end{array}$	41% 92% 44% ip g sw 38% 35% 36% 77% 48% 48% 48% 48% 48% 55%	25% 45% 45% 2-g 5 44% 5 58% 5 71% 5 45% 5 43% 5 36% 5 54% 5 54% 5 55%	59% 94% 44% ip sw_2-g a38% 67% a38% 66% 76% 37% 74% 80% 97% 33% 52%	94% 44% ip sw_2_3- 37% 69% 79% 37% 69% 97% 92% 48% 53%
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c c} 35\% \\ 58\% \\ 57\% \\ \hline \\ 57\% \\ \hline \\ 8w \\ 96\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 61\% \\ 53\% \\ 100\% \\ 53\% \\ 100\% \\ 55\% \\ 73\% \\ 64\% \\ 70\% \\ 58\% \\ 73\% \\ 64\% \\ 52\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 100\% \\ 55\% \\ 42\% \\ 56\% \\ \end{array}$	31% 58% 40% 2-g 49% 58% 67% 44% 49% 49% 40% 39% 40% 39% 40% 39% 49% 57% 58% 44% 72% 96% 60% 94% 60% 57% 52% 43%	$\begin{array}{c c} 50\% \\ \hline 50\% \\ \hline 50\% \\ \hline 89\% \\ \hline 88\% \\ \hline 99\% \\ \hline t w/s \\ 88\% \\ \hline 69\% \\ \hline 68\% \\ \hline 69\% \\ \hline 68\% \\ \hline 99\% \\ \hline 68\% \\ \hline 68\% \\ \hline 65\% \\ \hline 69\% \\ \hline 76\% \\ \hline 91\% \\ \hline 66\% \\ \hline 91\% \\ \hline 60\% \\ \hline 76\% \\ \hline 99\% \\ \hline 76\% \\ \hline 76\% \\ \hline 99\% \hline 99\% \\ \hline 99\% \hline 99\% \\ \hline 99\% \hline 99\%$	$\begin{array}{c} 50\% \\ 59\% \\ \hline 88\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2} \ 3_{-\mathbf{f}} \\ 96\% \\ \hline 58\% \\ 69\% \\ \hline 69\% \\ 64\% \\ 99\% \\ \hline 99\% \\ 99\% \\ \hline 59\% \\ \hline 59\% \\ \hline 58\% \\ \hline 49\% \\ \hline 58\% \\ 49\% \\ \hline 49\% \\ \hline 59\% \\ \hline 49\% \\ \hline 59\% \\ \hline 49\% \\ \hline 63\% \\ \hline 97\% \\ \hline 49\% \\ \hline 56\% \\ \hline 100\% \\ \hline 49\% \\ \hline 56\% \\ \hline 56\% \\ \hline 100\% \\ \hline 49\% \\ \hline 52\% \\ \hline 52\% \\ \end{array}$	41% 92% 44% ip g sw 35% 35% 35% 35% 35% 35% 35% 35% 48% 48% 48% 92% 92% 48% 55% 55% 55% 62% 76% 68% 63% 63% 63% 63% 63% 63% 63% 63% 55% 55% 55% 55% 55% 55% 55% 55% 55% 5	$\begin{array}{c c} 25\% \\ \hline 45\% \\ \hline 2 \text{-g} \\ \hline 5 \text{-g} \\ 5 \text{-g}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c c} 35\% \\ 58\% \\ 57\% \\ \hline \\ 57\% \\ \hline \\ 8w \\ 96\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 61\% \\ 53\% \\ 100\% \\ 53\% \\ 100\% \\ 55\% \\ 73\% \\ 64\% \\ 70\% \\ 58\% \\ 73\% \\ 64\% \\ 52\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 100\% \\ 55\% \\ 42\% \\ 56\% \\ \end{array}$	31% 58% 40% 2-g 49% 58% 67% 44% 49% 49% 40% 39% 40% 39% 40% 39% 49% 57% 58% 44% 72% 96% 60% 94% 60% 57% 52% 43%	$\begin{array}{c c} 50\% \\ \hline 50\% \\ \hline 50\% \\ \hline 89\% \\ \hline 88\% \\ \hline 99\% \\ \hline t w/s \\ 88\% \\ \hline 69\% \\ \hline 68\% \\ \hline 69\% \\ \hline 68\% \\ \hline 99\% \\ \hline 68\% \\ \hline 68\% \\ \hline 65\% \\ \hline 69\% \\ \hline 76\% \\ \hline 91\% \\ \hline 66\% \\ \hline 91\% \\ \hline 60\% \\ \hline 76\% \\ \hline 99\% \\ \hline 76\% \\ \hline 76\% \\ \hline 99\% \hline 99\% \\ \hline 99\% \hline 99\% \\ \hline 99\% \hline 99\%$	$\begin{array}{c} 50\% \\ 59\% \\ \hline 88\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2} \ 3_{-\mathbf{f}} \\ 96\% \\ \hline 58\% \\ 69\% \\ \hline 69\% \\ 64\% \\ 99\% \\ \hline 99\% \\ 99\% \\ \hline 59\% \\ \hline 59\% \\ \hline 58\% \\ \hline 49\% \\ \hline 58\% \\ 49\% \\ \hline 49\% \\ \hline 59\% \\ \hline 49\% \\ \hline 59\% \\ \hline 49\% \\ \hline 63\% \\ \hline 97\% \\ \hline 49\% \\ \hline 56\% \\ \hline 100\% \\ \hline 49\% \\ \hline 56\% \\ \hline 56\% \\ \hline 100\% \\ \hline 49\% \\ \hline 52\% \\ \hline 52\% \\ \end{array}$	41% 92% 44% ip g sw 35% 35% 35% 35% 35% 35% 35% 35% 48% 48% 48% 92% 92% 48% 55% 55% 55% 62% 76% 68% 63% 63% 63% 63% 63% 63% 63% 63% 55% 55% 55% 55% 55% 55% 55% 55% 55% 5	$\begin{array}{c c} 25\% \\ \hline 25\% \\ \hline 45\% \\ \hline 45\% \\ \hline 45\% \\ \hline 45\% \\ \hline 5\% \\ \hline 2 - g \\ 5 \\ 5\% \\ \hline 55\% \\ \hline 543\% \\ \hline 55\% \\ \hline 56\% \\ \hline 57\% \\ \hline 543\% \\ \hline 56\% \\ \hline 57\% \\ \hline 56\% \\ \hline 56\% \\ \hline 57\% \\ \hline 56\% \\ \hline 56\% \\ \hline 57\% \\ \hline 56\% \\ \hline 56\% \\ \hline 57\% \\ \hline 56\% \hline 56\% \\ \hline 56\% \hline 56\% \\ \hline 56\% \hline 56\% \hline 56\% \\ \hline 56\% $	59% 94% 44% ip sw_2-g 38% 67% 38% 67% 38% 67% 38% 67% 38% 67% 38% 67% 38% 76% 37% 92% 39% 52% 79% 48% 78% 63% 63% 63% 63% 63% 63% 63% 63% 63% 67% 71% 81% 63% 63% 40% 50% 23% 688%	$\begin{array}{c c c} 94\% \\ \hline 94\% \\ \hline 1p \\ \hline ip \\ \hline sw_2_3. \\ 69\% \\ 69\% \\ 75\% \\ 79\% \\ 37\% \\ 76\% \\ 97\% \\ 97\% \\ 92\% \\ 92\% \\ 48\% \\ 53\% \\ 74\% \\ 75\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 66\% \\ 70\% \\ 91\% \\ 72\% \\ 60\% \\ 42\% \\ 50\% \\ 59\% \end{array}$

	t	t	t	t	s	s	s	s
Dataset (Query		2-g	sw_2-g	sw_2_3-g	\mathbf{sw}	2-g	sw_2-g	sw_2_3-g
Amazon	51%	51%	51%	51%	76%	58%	85%	86%
Adnan Ibrahim	63%	57%	63%	63%	55%	58%	57%	50%
Amman	73%	57%	65%	73%	50%	52%	79%	79%
Jarrar	54%	52%	56%	56%	50%	59%	69%	69%
Alishaa'	56%	53%	57%	56%	69%	55%	93%	61%
Nahawnd	61%	55%	61%	61%	89%	57%	89%	89%
Qersh	50%	59%	52%	54%	57%	57%	57%	57%
Asia	92%	52%	92%	70%	94%	73%	92%	92%
Shir (Shi3r)	92%	54%	82%	82%	77%	57%	73%	80%
Arafat	54%	54%	54%	54%	64%	53%	70%	70%
Cameron	61%	61%	61%	61%	91%	52%	56%	59%
Maliki	50%	36%	64%	69%	39%	38%	47%	47%
	57%	70%	58%	58%	55%	56%	54%	54%
Baqara								
Sakhr	43%	39%	41%	43%	57%	41%	60%	60%
Iqteran	69%	51%	58%	58%	75%	58%	75%	78%
Aziz	62%	67%	59%	60%	74%	60%	74%	74%
Ahram	56%	52%	56%	56%	79%	53%	87%	87%
Jalamah	51%	52%	51%	51%	67%	62%	67%	67%
Malek Abdullal		93%	93%	92%	97%	92%	93%	92%
Jamaa Arabiya	56%	62%	56%	56%	62%	91%	94%	91%
Sakakini	75%	52%	51%	59%	90%	65%	90%	81%
Bursa	73%	73%	73%	73%	96%	59%	95%	89%
Ain	56%	56%	56%	56%	54%	52%	74%	74%
Thaheryah	55%	61%	55%	55%	61%	53%	94%	94%
Tarablus	51%	58%	58%	58%	58%	59%	58%	58%
Azhar	58%	54%	52%	58%	65%	56%	54%	54%
	0070			59%	55%	55%	54%	55%
Arabiyah	52%							
Arabiyah	52%	52%	58%					
Asad	43%	42%	53%	53%	51%	36%	63%	47%
Asad Athraa'	43% 63%	42% 63%	53% 63%	53% 64%	51% 92%	$\frac{36\%}{56\%}$	63% 94%	47% 94%
Asad	43% 63% 63%	42% 63% 53%	53% 63% 89%	53% 64% 88%	51% 92% 53%	36% 56% 56%	63% 94% 53%	47% 94% 53%
Asad Athraa' Qedra	43% 63% 63% t w/ s	42% 63% 53% t w/ s	53% 63% 89% tw/s	53% 64% 88% t w/ s	51% 92% 53% ip	36% 56% 56% ip	63% 94% 53% ip	47% 94% 53% ip
Asad Athraa' Qedra Dataset (Query)	43% 63% 63% t w/ s sw	42% 63% 53% t w/ s 2-g	53% 63% 89% t w/ s sw_2-g	53% 64% 88% t w/s sw_2_3-g	51% 92% 53% ip sw	36% 56% 56% ip 2-g	63% 94% 53% ip sw_2-g	47% 94% 53% ip ; sw_2_3-
Asad Athraa' Qedra Dataset (Query) Amazon	43% 63% 63% t w/ s sw 96%	42% 63% 53% t w/ s 2-g 56%	53% 63% 89% tw/s sw_2-g 96%	53% 64% 88% tw/s sw_2_3-g 96%	51% 92% 53% ip sw 52%	36% 56% 56% ip 2-g 55%	63% 94% 53% ip sw_2-g 52%	47% 94% 53% ip ; sw_2_3- 51%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	43% 63% 63% t w/s sw 96% 64%	42% 63% 53% t w/ s 2-g 56% 63%	53% 63% 89% t w/ s sw_2-g 96% 63%	53% 64% 88% t w/s sw_2_3-g 96% 63%	51% 92% 53% ip 52% 50%	36% 56% ip 2-g 55% 55%	63% 94% 53% ip sw_2-g 52% 67%	47% 94% 53% ip ; sw_2_3- 51% 70%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	43% 63% 63% t w/s sw 96% 64% 97%	42% 63% 53% t w/ s 2-g 56% 63% 69%	53% 63% 89% tw/s sw_2-g 96% 63% 71%	53% 64% 88% tw/s sw_2_3-g 96% 63% 71%	51% 92% 53% ip 52% 52% 50% 51%	36% 56% 56% 2-g 55% 59% 63%	63% 94% 53% ip sw_2-g 52% 67% 62%	47% 94% 53% ip i sw_2_3 - 51% 70% 59%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	43% 63% 63% t w/s sw 96% 64% 97% 99%	42% 63% 53% t w/ s 2-g 56% 63% 69% 54%	53% 63% 89% tw/s sw_2-g 96% 63% 71% 69%	53% 64% 88% tw/s sw_2_3-g 96% 63% 71% 66%	51% 92% 53% ip 53% 52% 50% 51% 78%	36% 56% 56% 2-g 55% 55% 55% 63% 63% 73%	63% 94% 53% ip sw_2-g 52% 67% 62% 77%	47% 94% 53% ip 5 sw_2_3- 51% 70% 59% 80%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	43% 63% 63% t w/ s sw 96% 64% 97% 99% 99%	42% 63% 53% t w/ s 2-g 56% 63% 69% 54% 58%	53% 63% 89% tw/s sw_2-g 96% 63% 71% 69% 99%	$\begin{array}{c c} 53\% \\ 64\% \\ \hline 88\% \\ \hline t w/s \\ sw_2_3-g \\ 96\% \\ 63\% \\ 71\% \\ 66\% \\ 99\% \end{array}$	51% 92% 53% ip 53% 52% 50% 51% 78% 51%	36% 56% 56% 2-g 55% 55% 55% 55% 55% 55% 63% 73% 56%	63% 94% 53% ip sw_2-g 52% 67% 62% 77% 51%	47% 94% 53% ip 51% 51% 59% 80% 51%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	43% 63% 63% t w/ s sw 96% 64% 97% 99% 99% 64%	42% 63% 53% t w/ s 2-g 56% 63% 69% 54% 58% 56%	$\begin{array}{c c} 53\% \\ \hline 63\% \\ \hline 89\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \mathbf{sw} _ 2 \text{-} \mathbf{g} \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 69\% \\ \hline 99\% \\ \hline 61\% \end{array}$	$\begin{array}{c c} 53\% \\ \hline 64\% \\ 88\% \\ \hline \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ 96\% \\ \hline 63\% \\ 71\% \\ 66\% \\ 99\% \\ \hline 61\% \end{array}$	51% 92% 53% ip 52% 52% 50% 51% 78% 51% 56%	36% 56% 56% 2-g 55% 55% 63% 63% 63% 56% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 55% 56% 50%	$\begin{array}{c c} 63\% \\ 94\% \\ 53\% \\ \hline \\ \mathbf{ip} \\ \mathbf{sw}_2-\mathbf{g} \\ 52\% \\ 6 \\ 67\% \\ 6 \\ 67\% \\ 6 \\ 77\% \\ 5 \\ 51\% \end{array}$	47% 94% 53% ip 51% 70% 80% 51% 77%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	43% 63% 63% t w/ s sw 96% 64% 99% 99% 64% 59%	42% 63% 53% t w/ s 2-g 56% 63% 69% 54% 58% 56% 53%	$\begin{array}{c c} 53\% \\ \hline 63\% \\ \hline 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ 69\% \\ 99\% \\ \hline 61\% \\ 94\% \\ \end{array}$	$\begin{array}{c c} 53\% \\ 64\% \\ 88\% \\ \hline t w/s \\ sw_2.3-g \\ 96\% \\ 63\% \\ 711\% \\ 66\% \\ 99\% \\ 61\% \\ 60\% \\ \end{array}$	51% 92% 53% ip sw 52% 50% 51% 51% 51% 56% 86%	36% 56% 56% 2-g 55%	$\begin{array}{c c} 63\% \\ \hline 94\% \\ \hline 53\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 52\% \\ \hline 67\% \\ \hline 62\% \\ \hline 77\% \\ 51\% \\ \hline 51\% \\ \hline 75\% \\ \hline 80\% \\ \end{array}$	47% 94% 53% ip 53% 51% 70% 59% 80% 51% 77% 71%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	43% 63% 63% t w/ s sw 96% 64% 97% 99% 99% 64% 59% 100%	42% 63% 53% t w/s 2-g 56% 63% 69% 54% 58% 56% 53% 50%	$\begin{array}{c c} 53\% \\ \hline 63\% \\ \hline 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{ssw_2-g} \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 69\% \\ 99\% \\ \hline 99\% \end{array}$	$\begin{array}{c c} 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \hline \mathbf{sw_2_3-g} \\ \hline 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 66\% \\ \hline 99\% \\ \hline 60\% \\ \hline 99\% \\ \end{array}$	51% 92% 53% ip 52% 52% 52% 51% 78% 51% 56% 86% 56%	36% 56% 56% 2-g 55% 55% 6 59% 6 6 50% 5 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 50% 6 65%	63% 94% 53% ip sw_2-g 52% 67% 51% 75% 80% 97%	47% 94% 53% ip 51% 70% 59% 80% 51% 77% 71% 97%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	43% 63% 53% 50% 64% 99% 99% 64% 59% 100% 81%	42% 63% 53% t w/s 2-g 56% 63% 69% 54% 58% 56% 56% 53% 50% 73%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 63\% \\ 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 96\% \\ \hline 63\% \\ 71\% \\ \hline 69\% \\ 99\% \\ \hline 61\% \\ 94\% \\ 99\% \\ 81\% \\ \end{array}$	$\begin{array}{c c} 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline t w/s \\ sw_2_3-g \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 66\% \\ 99\% \\ \hline 61\% \\ \hline 60\% \\ 99\% \\ \hline 83\% \\ \hline \end{array}$	51% 92% 53% ip 53% 52% 50% 51% 78% 51% 56% 86% 56% 92%	36% 56% 56% 56% 2-g 55% 6 59% 6 56% 6 55% 6 50% 6 50% 6 55% 6 55% 6 50% 6 51% 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	$\begin{array}{c c} 63\% \\ \hline 94\% \\ \hline 53\% \\ \hline \mathbf{ip} \\ \mathbf{sw.2-g} \\ 52\% \\ \hline 62\% \\ \hline 67\% \\ \hline 62\% \\ \hline 77\% \\ \hline 51\% \\ \hline 80\% \\ \hline 97\% \\ \hline 92\% \\ \end{array}$	47% 94% 53% ip 53% 51% 70% 59% 80% 51% 77% 71% 71% 97% 92%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	43% 63% 63% 54% 96% 64% 97% 99% 99% 64% 59% 100% 81% 97%	42% 63% 53% t w/s 2 -g 56% 63% 69% 69% 58% 56% 58% 56% 58%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ 89\% \\ \hline t w/s \\ sw_2-g \\ 96\% \\ \hline 63\% \\ 71\% \\ 69\% \\ 99\% \\ \hline 61\% \\ 99\% \\ 61\% \\ 94\% \\ 99\% \\ 81\% \\ 77\% \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$	51% 92% 53% ip 53% 52% 50% 51% 51% 51% 56% 86% 56% 92% 52%	36% 56% 56% 2-g 6 55% 6 6 50% 6 6 50% 6 6 6 6 6 50%	$\begin{array}{c c} 63\% \\ \hline 94\% \\ 53\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 52\% \\ \hline 67\% \\ 56\% \\ 51\% \\ \hline 77\% \\ 80\% \\ 97\% \\ 80\% \\ 97\% \\ 51\% \\ \hline \end{array}$	$\begin{array}{r} 47\% \\ 94\% \\ 53\% \\ \hline \mathbf{ip} \\ \mathbf{s} & \mathbf{sw}_2_3- \\ 51\% \\ 70\% \\ 59\% \\ 80\% \\ 51\% \\ 77\% \\ 71\% \\ 77\% \\ 97\% \\ 92\% \\ 56\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	43% 63% 63% t w/ s sw 96% 64% 97% 99% 99% 64% 59% 100% 81% 97% 92%	$\begin{array}{c} 42\% \\ 63\% \\ 53\% \\ \hline \\ \mathbf{t} \ \mathbf{w} / \mathbf{s} \\ \mathbf{2-g} \\ 56\% \\ 63\% \\ 69\% \\ 54\% \\ 56\% \\ 58\% \\ 56\% \\ 53\% \\ 56\% \\ 53\% \\ 56\% \\ 53\% \\ 62\% \\ \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 69\% \\ 99\% \\ \hline 99\% \\ \hline 61\% \\ 94\% \\ \hline 99\% \\ \hline 81\% \\ \hline 77\% \\ 93\% \end{array}$	$\begin{array}{c c} 53\% \\ 64\% \\ \hline 88\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	51% 92% 53% ip 52% 52% 50% 50% 51% 51% 56% 86% 56% 92% 61%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	63% 94% 53% ip sw_2-g 52% 67% 62% 77% 51% 80% 97% 51% 51% 59%	$\begin{array}{c c} 47\% \\ 94\% \\ \hline 94\% \\ \hline 53\% \\ \hline \mathbf{ip} \\ \mathbf{s} & \mathbf{sw}_2_3- \\ \hline 51\% \\ \hline 70\% \\ \hline 59\% \\ \hline 80\% \\ \hline 51\% \\ \hline 77\% \\ \hline 71\% \\ \hline 97\% \\ \hline 92\% \\ \hline 56\% \\ \hline 60\% \\ \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	43% 63% 63% t w/ s sw 96% 64% 97% 99% 64% 59% 100% 81% 97% 92% 62%	42% 63% 53% t w/s 2-g 56% 63% 69% 54% 58% 56% 53% 50% 73% 58% 62% 44%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 63\% \\ 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ 69\% \\ 99\% \\ \hline 61\% \\ 94\% \\ 99\% \\ \hline 81\% \\ 77\% \\ 77\% \\ 93\% \\ \hline 63\% \\ \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline t w/s \\ \hline sw_2_3-g \\ \hline 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 66\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 83\% \\ \hline 96\% \\ \hline 61\% \\ \hline 63\% \\ \hline \end{array}$	51% 92% 53% ip sw Soft 51% 51% 51% 56% 92% 56% 92% 56% 92% 56% 92% 55%	36% 56% 56% 56% 2-g 55% 55% 55% 6 56% 6 55% 55% 6 6 56% 6 55% 6 55% 6 55% 6 50% 6 6 6 6 6 6 6 6 6 6 6 6 6 7% 6 37%	$\begin{array}{c c} 63\% \\ \hline 63\% \\ \hline 94\% \\ \hline 53\% \\ \hline \mathbf{ip} \\ \mathbf{sw}_2 \mathbf{\cdot} \mathbf{g} \\ 52\% \\ \hline 667\% \\ \hline 62\% \\ \hline 77\% \\ \hline 51\% \\ \hline 51\% \\ \hline 80\% \\ \hline 97\% \\ \hline 92\% \\ \hline 51\% \\ \hline 55\% \\ \hline 55\% \\ \end{array}$	$\begin{array}{c c} 47\% \\ 94\% \\ 53\% \\ \hline \\ \mathbf{ip} \\ 5 \\ 5 \\ 51\% \\ 70\% \\ 59\% \\ 80\% \\ 51\% \\ 77\% \\ 71\% \\ 97\% \\ 92\% \\ 56\% \\ 60\% \\ 75\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	$\begin{array}{c c} & 43\% \\ & 63\% \\ \hline & 63\% \\ \hline & w/s \\ sw \\ 96\% \\ 64\% \\ 97\% \\ 99\% \\ 64\% \\ 59\% \\ 100\% \\ 81\% \\ 97\% \\ 92\% \\ 62\% \\ 58\% \\ \end{array}$	42% 63% 53% 1 w/ s 2-g 56% 63% 69% 54% 56% 56% 56% 53% 50% 73% 58% 62% 44%	$\begin{array}{c c} 53\% \\ 63\% \\ 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 96\% \\ 63\% \\ 71\% \\ 66\% \\ 99\% \\ 61\% \\ 99\% \\ 61\% \\ 99\% \\ 81\% \\ 77\% \\ 93\% \\ 63\% \\ 67\% \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$	51% 92% 53% ip sw 52% 51% 51% 56% 92% 51% 56% 92% 51% 56% 92% 51% 56% 52% 55% 55% 55% 55%	36% 56% 56% 56% ip 2-g 55% 6 55% 6 56% 6 56% 6 6 50% 6 50% 6 51% 6 6 6 6 6 6 6 6 6 6 6 6 78%	$\begin{array}{c c} 63\% \\ \hline & 63\% \\ \hline & 94\% \\ \hline & 53\% \\ \hline & \mathbf{ip} \\ \hline & \mathbf{sw_2-g} \\ 52\% \\ \hline & 67\% \\ \hline & 62\% \\ \hline & 51\% \\ \hline & 51\% \\ \hline & 77\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 92\% \\ \hline & 51\% \\ \hline & 55\% \\ \hline & 80\% \\ \end{array}$	$\begin{array}{r c} 47\% \\ 94\% \\ 53\% \\ \hline \mathbf{ip} \\ 5 & \mathbf{sw_2} & 3 \\ 70\% \\ 59\% \\ 80\% \\ 51\% \\ 71\% \\ 71\% \\ 97\% \\ 92\% \\ 56\% \\ 60\% \\ 75\% \\ 80\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	43% 63% 63% t w/ s sw 96% 64% 97% 99% 64% 59% 100% 81% 97% 92% 62%	42% 63% 53% t w/s 2-g 56% 63% 69% 54% 58% 56% 53% 50% 73% 58% 62% 44%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 63\% \\ 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ 69\% \\ 99\% \\ \hline 61\% \\ 94\% \\ 99\% \\ \hline 81\% \\ 77\% \\ 77\% \\ 93\% \\ \hline 63\% \\ \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline t w/s \\ \hline sw_2_3-g \\ \hline 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 66\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 83\% \\ \hline 96\% \\ \hline 61\% \\ \hline 63\% \\ \hline \end{array}$	51% 92% 53% image: second	36% 56% 56% 56% 56% 2-g 55% 6 55% 6 56% 2-g 55% 6 56% 6 56% 6 56% 6 50% 6 50% 6 50% 6 6 6 6 6 6 6 6 78% 6 6 78% 6 47%	$\begin{array}{c c} 63\% \\ \hline 94\% \\ \hline 53\% \\ \hline \\ \hline \\ & $\mathbf{sw_2-g}$ \\ \hline \\ & 67% \\ \hline \\ & 67% \\ \hline \\ & 62% \\ \hline \\ & 77% \\ \hline \\ & 675% \\ \hline \\ & 80% \\ \hline \\ & 97% \\ \hline \\ & 51% \\ \hline \\ & 80% \\ \hline \\ & 92% \\ \hline \\ & 55% \\ \hline \\ & 80% \\ \hline \\ & 59% \\ \hline \end{array}$	$\begin{array}{c c} 47\% \\ 94\% \\ \hline 53\% \\ \hline ip \\ 53\% \\ \hline 53\% \\ \hline 70\% \\ 59\% \\ 80\% \\ 59\% \\ 80\% \\ 51\% \\ 77\% \\ 71\% \\ 97\% \\ 92\% \\ 56\% \\ 60\% \\ 75\% \\ \end{array}$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz	$\begin{array}{c c} & 43\% \\ & 63\% \\ \hline & 63\% \\ \hline & t \ w/ \ s \\ & sw \\ 96\% \\ 64\% \\ 97\% \\ 99\% \\ 99\% \\ 99\% \\ 64\% \\ 59\% \\ 100\% \\ 81\% \\ 97\% \\ 92\% \\ 62\% \\ 58\% \\ 71\% \\ 63\% \\ 75\% \\ \end{array}$	42% 63% 53% t w/s 2-g 56% 63% 54% 58% 58% 50% 73% 58% 62% 44% 58% 62% 60%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 89\% \\ \hline w/s \\ 89\% \\ \hline w/s \\ 96\% \\ \hline 63\% \\ 71\% \\ 69\% \\ 99\% \\ \hline 61\% \\ 99\% \\ 61\% \\ 99\% \\ 61\% \\ 99\% \\ 61\% \\ 69\% \\ 77\% \\ 99\% \\ 63\% \\ 67\% \\ 69\% \\ 79\% \\ 91\% \\ 56\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 51\% \\ 92\% \\ 53\% \\ \hline \mathbf{ip} \\ \mathbf{sw} \\ 52\% \\ 50\% \\ 51\% \\ 51\% \\ 51\% \\ 51\% \\ 51\% \\ 51\% \\ 55\% \\ 56\% \\ 92\% \\ 55\% \\ 61\% \\ 55\% \\ 61\% \\ 77\% \\ 69\% \end{array}$	36% 56% 56% 56% 2-g 6 55% 6 6 56% 6 56% 6 59% 6 6 55% 6 78% 6 52% 6 51%	$\begin{array}{c c} 63\% \\ \hline & 63\% \\ \hline & 94\% \\ \hline & 53\% \\ \hline & \mathbf{ip} \\ & \mathbf{sw_2-g} \\ \hline & 52\% \\ \hline & 67\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 80\% \\ \hline & 77\% \\ \hline & 80\% \\ \hline & 77\% \\ \hline & 80\% \\ \hline & 51\% \\ \hline & 51\% \\ \hline & 59\% \\ \hline & 55\% \\ \hline & 80\% \\ \hline & 59\% \\ \hline & 59\% \\ \hline & 66\% \\ \hline & 67\% \\ \end{array}$	$\begin{array}{c c} 47\% \\ 94\% \\ 53\% \\ \hline \\ \mathbf{ip} \\ 5 \\ 5 \\ 51\% \\ 70\% \\ 59\% \\ 80\% \\ 51\% \\ 77\% \\ 71\% \\ 71\% \\ 97\% \\ 92\% \\ 56\% \\ 60\% \\ 75\% \\ 80\% \\ 61\% \\ 75\% \\ 66\% \\ \end{array}$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya	$\begin{array}{c c} & 43\% \\ & 63\% \\ \hline & 63\% \\ \hline & w/s \\ & sw \\ & 96\% \\ & 64\% \\ & 97\% \\ & 99\% \\ & 64\% \\ & 59\% \\ & 100\% \\ & 100\% \\ & 81\% \\ & 97\% \\ & 92\% \\ & 62\% \\ & 58\% \\ & 71\% \\ & 63\% \\ & 75\% \\ & 66\% \\ & 53\% \\ & 99\% \\ & 61\% \end{array}$	42% 63% 53% 2-g 56% 63% 69% 54% 58% 56% 53% 56% 58% 62% 44% 58% 62% 44% 58% 60% 55% 74% 97%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 89\% \\ \hline 89\% \\ \hline t w/s \\ 89\% \\ \hline c \\ 30\% \\ \hline 63\% \\ 71\% \\ \hline 63\% \\ 99\% \\ \hline 61\% \\ 99\% \\ 99\% \\ \hline 61\% \\ 99\% \\ 99\% \\ \hline 63\% \\ \hline 77\% \\ 93\% \\ \hline 63\% \\ \hline 63\% \\ \hline 67\% \\ \hline 69\% \\ \hline 79\% \\ \hline 91\% \\ \hline 56\% \\ \hline 100\% \\ \hline 56\% \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline tw/s \\ \hline sw_2_3-g \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 66\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 63\% \\ \hline 63\% \\ \hline 63\% \\ \hline 64\% \\ \hline 64\% \\ \hline 64\% \\ \hline 61\% \\ \hline 65\% \\ \hline 56\% \\ \hline 56\% \\ \end{array}$	$\begin{array}{c} 51\%\\92\%\\53\%\\ \hline \\ 53\%\\ \hline \\ 52\%\\50\%\\50\%\\50\%\\50\%\\50\%\\50\%\\50\%\\50\%\\50\%\\50$	$\begin{array}{c c} 36\% \\ \hline 56\% \\ \hline 56\% \\ \hline 56\% \\ \hline 2-g \\ 2-g \\ 6 \\ 55\% \\ \hline 6 \\ 52\% \\ \hline 6 \\ 52\% \\ \hline 6 \\ 51\% \\ \hline 72\% \\ 72\% \\ \hline 72\% \\ 72\%$	$\begin{array}{c c} 63\% \\ \hline & 63\% \\ \hline & 94\% \\ \hline & 53\% \\ \hline & \mathbf{ip} \\ \hline & \mathbf{sw_2-g} \\ 52\% \\ \hline & 67\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 80\% \\ \hline & 75\% \\ \hline & 80\% \\ \hline & 92\% \\ \hline & 51\% \\ \hline & 59\% \\ \hline & 55\% \\ \hline & 80\% \\ \hline & 55\% \\ \hline & 66\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 675\% \\ \hline & 74\% \\ \end{array}$	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c} & 43\% \\ & 63\% \\ \hline & 63\% \\ \hline & t \ w/ \ s \\ & sw \\ & 96\% \\ & 996\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 100\% \\ & 81\% \\ & 75\% \\ & 62\% \\ & 71\% \\ & 62\% \\ & 75\% \\ & 66\% \\ & 53\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 51\% \\ & 51\% \end{array}$	42% 63% 53% 2-g 56% 63% 54% 54% 58% 56% 62% 44% 58% 62% 44% 58% 60% 55% 74% 96% 97% 65% 63% 56% 63% 54%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 63\% \\ 89\% \\ \hline t w/s \\ 8w_2-g \\ 96\% \\ \hline 63\% \\ \hline 63\% \\ \hline 99\% \\ 99\% \\ \hline 61\% \\ 99\% \\ 99\% \\ \hline 61\% \\ 99\% \\ \hline 99\% \\ \hline 61\% \\ \hline 99\% \\ \hline 99\% \\ \hline 61\% \\ \hline 99\% \\ \hline 99\% \\ \hline 61\% \\ \hline 69\% \\ \hline 77\% \\ \hline 60\% \\ \hline 60\% \\ \hline 67\% \\ \hline 60\% \\ \hline 60\% \\ \hline 72\% \\ \hline 62\% \\ \hline 62\% \\ \hline 59\% \\ \hline 59\% \\ \hline 86\% \\ \hline \end{array}$	$\begin{array}{c c} 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline t w/s \\ \hline sw_2_3-g \\ 96\% \\ \hline 63\% \\ \hline 71\% \\ \hline 66\% \\ 99\% \\ \hline 61\% \\ \hline 60\% \\ 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 61\% \\ \hline 60\% \\ \hline 99\% \\ \hline 55\% \\ \hline 62\% \\ \hline 85\% \\ \hline 86\% \\ \hline 62\% \\ \hline 100\% \\ \hline 51\% \\ \hline 86\% \\ \hline 86\% \\ \hline \end{array}$	$\begin{array}{c c} 51\% \\ 92\% \\ 53\% \\ \hline \\ 53\% \\ \hline \\ 50\% \\ 50\% \\ 51\% \\ 51\% \\ 51\% \\ 51\% \\ 51\% \\ 51\% \\ 55\% \\ 56\% \\ 52\% \\ 52\% \\ 61\% \\ 55\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 51\%$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	63% 94% 53% ip sw_2-g 52% 67% 51% 80% 97% 51% 80% 97% 51% 59% 611% 59% 63% 67% 51% 79% 666% 67% 51% 75% 79% 667% 51% 75% 74% 88% 70% 73% 82% 55% 58%	$\begin{array}{r c c} 47\% \\ 94\% \\ \hline 94\% \\ \hline 53\% \\ \hline 1 p \\ \vdots & sw_2_3 \\ \hline 51\% \\ 70\% \\ 59\% \\ 80\% \\ \hline 51\% \\ 77\% \\ 71\% \\ 97\% \\ 71\% \\ 97\% \\ 60\% \\ \hline 75\% \\ 60\% \\ 61\% \\ 75\% \\ 66\% \\ 61\% \\ 75\% \\ 66\% \\ 67\% \\ 51\% \\ 72\% \\ 66\% \\ 67\% \\ 51\% \\ 76\% \\ 55\% \\ 53\% \\ 58\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} & 43\% \\ & 63\% \\ \hline & 63\% \\ \hline & t \ w/ \ s \\ & sw \\ 96\% \\ 64\% \\ 99\% \\ 99\% \\ 99\% \\ 64\% \\ 59\% \\ 100\% \\ 81\% \\ 97\% \\ 92\% \\ 62\% \\ 58\% \\ 71\% \\ 66\% \\ 53\% \\ 99\% \\ 66\% \\ 53\% \\ 99\% \\ 61\% \\ 90\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 51\% \\ 61\% \\ 51\% \\ 61\% \end{array}$	42% 63% 53% 2-g 56% 63% 54% 58% 56% 53% 58% 62% 44% 58% 62% 44% 58% 62% 44% 58% 62% 55% 74% 55% 74% 55% 63% 55% 54% 52%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 89\% \\ \hline 89\% \\ \hline t w/s \\ 89\% \\ \hline t w/s \\ 96\% \\ \hline 63\% \\ 71\% \\ \hline 69\% \\ 99\% \\ \hline 61\% \\ 99\% \\ 99\% \\ \hline 61\% \\ 99\% \\ \hline 63\% \\ \hline 62\% \\ \hline 100\% \\ \hline 56\% \\ \hline 90\% \\ \hline 62\% \\ \hline 62\% \\ \hline 62\% \\ \hline 86\% \\ \hline 86\% \\ \hline 58\% \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c c} 51\% \\ 92\% \\ 53\% \\ 53\% \\ 58\% \\ 50\% \\ 50\% \\ 51\% \\ 78\% \\ 51\% \\ 56\% \\ 56\% \\ 92\% \\ 66\% \\ 92\% \\ 66\% \\ 92\% \\ 65\% \\ 65\% \\ 65\% \\ 67\% \\ 65\% \\ 67\% \\ 65\% \\ 67\% \\ 65\% \\ 91\% \\ 91\% \\ 80\% \\ 91\%$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 63\% \\ \hline & 63\% \\ \hline & 94\% \\ \hline & 53\% \\ \hline & \mathbf{ip} \\ \hline & \mathbf{sw_2-g} \\ 52\% \\ \hline & 67\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 51\% \\ \hline & 75\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 51\% \\ \hline & 75\% \\ \hline & 80\% \\ \hline & 59\% \\ \hline & 59\% \\ \hline & 59\% \\ \hline & 55\% \\ \hline & 80\% \\ \hline & 55\% \\ \hline & 80\% \\ \hline & 55\% \\ \hline & 80\% \\ \hline & 75\% \\ \hline & 51\% \\ \hline & 75\% \\ \hline & 51\% \\ \hline & 77\% \\ \hline & 88\% \\ \hline & 77\% \\ \hline & 88\% \\ \hline & 73\% \\ \hline & 55\% \\ \hline & 64\% \\ \hline \end{array}$	$\begin{array}{r} 47\% \\ 94\% \\ 53\% \\ \hline 1 \\ 51\% \\ 70\% \\ 59\% \\ 80\% \\ 51\% \\ 71\% \\ 71\% \\ 71\% \\ 92\% \\ 56\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 67\% \\ 51\% \\ 66\% \\ 66\% \\ 67\% \\ 51\% \\ 66\% \\ 66\% \\ 65\% \\ 53\% \\ 58\% \\ 64\% \\ 64\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c c} & 43\% \\ & 63\% \\ \hline & 63\% \\ \hline & t w/s \\ & sw \\ & 96\% \\ & 64\% \\ & 97\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 64\% \\ & 59\% \\ & 100\% \\ & 81\% \\ & 92\% \\ & 62\% \\ & 62\% \\ & 62\% \\ & 63\% \\ & 75\% \\ & 66\% \\ & 53\% \\ & 99\% \\ & 61\% \\ & 90\% \\ & 99\% \\ & 99\% \\ & 61\% \\ & 59\% \\ & 51\% \\ & 61\% \\ & 61\% \\ & 41\% \end{array}$	42% 63% 53% 2-g 56% 69% 54% 58% 53% 53% 53% 53% 62% 44% 58% 62% 44% 58% 60% 94% 55% 74% 96% 99% 95% 55% 53% 59% 54%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 63\% \\ 89\% \\ \hline t w/s \\ 89\% \\ \hline c 33\% \\ \hline 63\% \\ \hline 63\% \\ \hline 71\% \\ \hline 69\% \\ 99\% \\ \hline 81\% \\ \hline 77\% \\ 99\% \\ \hline 63\% \\ \hline 63\% \\ \hline 67\% \\ \hline 69\% \\ \hline 79\% \\ \hline 66\% \\ \hline 67\% \\ \hline 100\% \\ \hline 56\% \\ \hline 67\% \\ \hline 100\% \\ \hline 56\% \\ \hline 56\% \\ \hline 56\% \\ \hline 58\% \\ \hline 58\% \\ \hline 43\% \\ \hline 43\% \\ \end{array}$	$\begin{array}{c c} 53\% \\ 64\% \\ 88\% \\ \hline t w/s \\ 88\% \\ \hline 61\% \\ 60\% \\ 99\% \\ 61\% \\ 60\% \\ 99\% \\ 61\% \\ 60\% \\ 99\% \\ 61\% \\ 63\% \\ 63\% \\ 63\% \\ 63\% \\ 62\% \\ 61\% \\ 61\% \\ 66\% \\ 62\% \\ 61\% \\ 66\% \\ 62\% \\ 62\% \\ 62\% \\ 100\% \\ 51\% \\ 88\% \\ 58\% \\ 88\% \\ 58\% \\ 95\% \\ 95\% \\ \end{array}$	$\begin{array}{c c} 51\% \\ 92\% \\ 53\% \\ 53\% \\ 50\%$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 63\% \\ \hline & 63\% \\ \hline & 94\% \\ \hline & 53\% \\ \hline & ip \\ & sw_2-g \\ \hline & 67\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 51\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 51\% \\ \hline & 59\% \\ \hline & 59\% \\ \hline & 59\% \\ \hline & 59\% \\ \hline & 67\% \\ \hline & 67\% \\ \hline & 66\% \\ \hline & 74\% \\ \hline & 88\% \\ \hline & 70\% \\ \hline & 73\% \\ \hline & 82\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 66\% \\ \hline & 74\% \\ \hline & 88\% \\ \hline & 70\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 64\% \\ \hline & 37\% \\ \hline \end{array}$	$\begin{array}{r} 47\% \\ 94\% \\ 94\% \\ 53\% \\ \hline 1 \\ 1 \\ 53\% \\ \hline 2 \\ 33\% \\ \hline 34\% \\ 51\% \\ 70\% \\ 59\% \\ 80\% \\ 51\% \\ 77\% \\ 71\% \\ 97\% \\ 92\% \\ 56\% \\ 60\% \\ 60\% \\ 61\% \\ 75\% \\ 66\% \\ 61\% \\ 61\% \\ 61\% \\ 75\% \\ 66\% \\ 66\% \\ 65\% \\ 51\% \\ 65\% \\ 53\% \\ 58\% \\ 58\% \\ 64\% \\ 37\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} & 43\% \\ & 63\% \\ \hline & 63\% \\ \hline & t \ w/ \ s \\ & sw \\ 96\% \\ 64\% \\ 99\% \\ 99\% \\ 99\% \\ 64\% \\ 59\% \\ 100\% \\ 81\% \\ 97\% \\ 92\% \\ 62\% \\ 58\% \\ 71\% \\ 66\% \\ 53\% \\ 99\% \\ 66\% \\ 53\% \\ 99\% \\ 61\% \\ 90\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 51\% \\ 61\% \\ 51\% \\ 61\% \end{array}$	42% 63% 53% 2-g 56% 63% 54% 58% 56% 53% 58% 62% 44% 58% 62% 44% 58% 62% 44% 58% 62% 55% 74% 55% 74% 55% 63% 55% 54% 52%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 89\% \\ \hline 89\% \\ \hline t w/s \\ 89\% \\ \hline t w/s \\ 96\% \\ \hline 63\% \\ 71\% \\ \hline 69\% \\ 99\% \\ \hline 61\% \\ 99\% \\ 99\% \\ \hline 61\% \\ 99\% \\ \hline 63\% \\ \hline 62\% \\ \hline 100\% \\ \hline 56\% \\ \hline 90\% \\ \hline 62\% \\ \hline 62\% \\ \hline 86\% \\ \hline 86\% \\ \hline 58\% \end{array}$	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 64\% \\ \hline 88\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c c} 51\% \\ 92\% \\ 53\% \\ 53\% \\ 58\% \\ 50\% \\ 50\% \\ 51\% \\ 78\% \\ 51\% \\ 56\% \\ 56\% \\ 92\% \\ 66\% \\ 92\% \\ 66\% \\ 92\% \\ 65\% \\ 65\% \\ 65\% \\ 67\% \\ 65\% \\ 67\% \\ 65\% \\ 67\% \\ 65\% \\ 91\% \\ 91\% \\ 80\% \\ 91\%$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 63\% \\ \hline & 63\% \\ \hline & 94\% \\ \hline & 53\% \\ \hline & $\mathbf{sw_2-g}$ \\ \hline & $\mathbf{sw_2-g}$ \\ \hline & 67% \\ \hline & 62% \\ \hline & 77% \\ \hline & 67% \\ \hline & 51% \\ \hline & 75% \\ \hline & 80% \\ \hline & 97% \\ \hline & 51% \\ \hline & 59% \\ \hline & 55% \\ \hline & 68% \\ \hline & 67% \\ \hline & 74% \\ \hline & 88% \\ \hline & 70% \\ \hline & 73% \\ \hline & 82% \\ \hline & 55% \\ \hline & 88% \\ \hline & 77% \\ \hline & 82% \\ \hline & 55% \\ \hline & 55% \\ \hline & 55% \\ \hline & 64% \\ \hline & 37% \\ \hline \end{array}$	$\begin{array}{r} 47\% \\ 94\% \\ 53\% \\ \hline 1 \\ 70\% \\ 59\% \\ 80\% \\ 51\% \\ 70\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 92\% \\ 56\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 55\% \\ 53\% \\ 58\% \\ 64\% \\ 64\% \end{array}$

Table C.16: Per level and query weighted recall when using BRF benchmarks for Google.

Table C.17: Per level and query weighted precision when using BRF benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	53%	53%	53%	53%	82%	77%	87%	88%
Adnan Ibrahim		71%	75%	75%	58%	77%	61%	50%
Amman	79%	77%	79%	79%	50%	76%	80%	80%
Jarrar	76%	76%	77%	77%	50%	77%	81%	81%
Alishaa'	70%	76%	77%	77%	81%	76%	93%	78%
Nahawnd	64%	59%	64%	64%	90%	71%	90%	90%
Qersh	50%	73%	63%	68%	65%	65%	65%	65%
Asia	93%	76%	93%	77%	95%	82%	93%	93%
Shir (Shi3r)	92%	76%	87%	87%	84%	77%	82%	86%
Arafat	76%	76%	76%	76%	79%	76%	81%	81%
Cameron	72%	72%	72%	72%	91%	63%	64%	70%
Maliki	71%	44%	74%	84%	48%	46%	59%	59%
Baqara	77%	81%	77%	77%	59%	77%	61%	61%
Sakhr	56%	59%	53%	53%	52%	52%	42%	42%
Iqteran	81%	53%	77%	77%	83%	77%	83%	85%
.	64%	68%	61%	62%	83%	78%	83%	83%
Aziz								
Ahram	62%	76%	62%	62%	85%	76%	90%	90%
Jalamah	52%	76%	52%	52%	80%	78%	80%	80%
Malek Abdullal		94%	94%	93%	97%	93%	94%	93%
Jamaa Arabiya		78%	62%	62%	72%	92%	95%	92%
Sakakini	83%	76%	54%	77%	92%	79%	92%	86%
Bursa	77%	77%	77%	77%	96%	73%	95%	91%
Ain	77%	77%	77%	77%	61%	63%	83%	83%
Thaheryah	63%	78%	63%	63%	64%	76%	94%	94%
Tarablus	51%	77%	77%	77%	69%	70%	69%	69%
Azhar	72%	76%	56%	77%	70%	77%	58%	58%
Arabiyah	7007	76%	67%	77%	69%	69%	64%	69%
Arabiyan	76%							
Arabiyan	53%	37%	61%	61%	42%	55%	63%	51%
				61% 79%	42% 92%	55% 77%	63% 94%	51% 94%
Asad	53%	37%	61%					
Asad Athraa'	53% 75%	37% 75%	61% 75% 89%	79%	92%	77%	94% 59%	94%
Asad Athraa' Qedra	53% 75% 79%	37% 75% 76% tw/s	61% 75% 89% tw/s	79% 88% tw/s	92% 59% ip	77% 77% ip	94% 59% ip	94% 59% ip
Asad Athraa' Qedra	53% 75% 79% t w/ s	37% 75% 76%	61% 75% 89% tw/s	79% 88% tw/s	92% 59% ip	77% 77% ip 2-g	94% 59% ip sw_2-g	94% 59% ip
Asad Athraa' Qedra Dataset (Query)	53% 75% 79% t w/ s sw	37% 75% 76% t w/ s 2-g	61% 75% 89% tw/s sw_2-g	79% 88% t w/ s sw_2_3-g	92% 59% ip g sw	77% 77% ip 2-g 76%	94% 59% ip sw_2-g 76%	94% 59% ip sw_2_3-g
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	53% 75% 79% t w/ s sw 96% 76%	37% 75% 76% t w/ s 2-g 62% 75%	61% 75% 89% t w/ s sw_2-g 96% 75%	79% 88% tw/s sw_2_3-g 96% 75%	92% 59% ip g sw 76% 50%	77% 77% ip 2-g 76% 70%	94% 59% ip sw_2-g 76% 68%	94% 59% ip sw_2_3-1 59% 72%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	53% 75% 79% t w/s sw 96% 76% 97%	37% 75% 76% t w/ s 2-g 62% 75% 77%	61% 75% 89% sw_2-g 96% 75% 75%	T9% 88% tw/s sw_2_3-g 96% 75% 78%	92% 59% ip g sw 76% 50% 75%	77% 77% ip 2-g 76% 70% 75%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	94% 59% ip sw_2_3- 59% 72% 65%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	53% 75% 79% t w/ s sw 96% 76% 97% 99%	37% 75% 76% t w/ s 2-g 62% 75% 77% 64%	61% 75% 89% t w/s sw_2-g 96% 75% 78% 73%	T9% 88% tw/s sw_2_3-g 96% 75% 78% 71%	92% 59% ip g sw 76% 50% 75% 85%	77% 77% ip 2-g 76% 70% 70% 82%	94% 59% ip sw_2-g 76% 68% 66% 84%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline \mathbf{ip} \\ \mathbf{sw}_2_3-t} \\ 59\% \\ \hline 72\% \\ 65\% \\ \hline 86\% \\ \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	53% 75% 79% t w/ s sw 96% 76% 97% 99%	37% 75% 76% t w/ s 2-g 62% 75% 77% 64% 77%	61% 75% 89% t w/s sw_2-g 96% 75% 78% 73% 99%	Type 88% tw/s sw_2_3-g 96% 75% 78% 71% 99%	92% 59% ip g sw 76% 50% 75% 85% 59%	77% ip 2-g 76% 76% 82% 77%	94% 59% ip sw_2-g 76% 68% 666% 84% 59%	94% 59% sw_2_3-3 59% 72% 65% 86% 59%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	53% 75% 79% t w/ s sw 96% 76% 97% 99% 99% 69%	37% 75% 76% tw/s 2-g 62% 75% 77% 64% 77% 77%	61% 75% 89% tw/s sw_2-g 96% 75% 78% 73% 99% 64%	$\begin{array}{c c} \hline 79\% \\ \hline 88\% \\ \hline {\bf t w/s} \\ \hline {\bf sw_2 3-g} \\ 96\% \\ \hline 75\% \\ \hline 75\% \\ \hline 78\% \\ \hline 71\% \\ \hline 99\% \\ \hline 64\% \end{array}$	92% 59% ip g sw 76% 50% 75% 85% 59% 67%	77% ip 2-g 76% 76% 76% 82% 77%	94% 59% ip sw_2-g 76% 68% 66% 84% 59% 84% 59%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline \mathbf{sw_2} \ \mathbf{3-}_{7} \\ 59\% \\ \hline 72\% \\ 65\% \\ 86\% \\ 59\% \\ 83\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	53% 75% 79% t w/ s sw 96% 76% 97% 99% 99% 69% 68%	37% 75% 76% t w/ s 2-g 62% 75% 75% 64% 77% 77% 77%	61% 75% 89% sw_2-g 96% 75% 78% 73% 99% 64% 94%	$\begin{array}{c c} \hline 79\% \\ \hline 88\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw}_2_3-\mathbf{g} \\ \hline 96\% \\ \hline 75\% \\ \hline 78\% \\ \hline 71\% \\ \hline 99\% \\ \hline 64\% \\ \hline 74\% \end{array}$	92% 59% ip g sw 76% 50% 75% 85% 67% 87%	77% ip 2-g 76% 76% 76% 70% 82% 77% 50% 75% 75% 75%	94% 59% ip sw_2-g 0 76% 6 68% 6 66% 84% 59% 82% 82% 83% 83%	94% 59% sw_2_3-; 72% 65% 86% 59% 83%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	53% 75% 79% t w/ s sw 96% 76% 97% 99% 69% 68% 100%	37% 75% 76% t w/ s 2-g 62% 75% 77% 64% 77% 77% 76% 50%	$\begin{array}{c c} 61\% \\ \hline 75\% \\ 89\% \\ \hline t w/s \\ sw_2-g \\ 96\% \\ \hline 75\% \\ 75\% \\ \hline 78\% \\ 73\% \\ 99\% \\ \hline 64\% \\ 94\% \\ 99\% \\ \end{array}$	$\begin{array}{c c} 79\% \\ \hline 88\% \\ \hline {\bf t w/s} \\ sw_2 3-e \\ 96\% \\ \hline 75\% \\ 78\% \\ \hline 71\% \\ 99\% \\ \hline 64\% \\ \hline 74\% \\ 99\% \end{array}$	92% 59% ip g sw 76% 50% 75% 85% 67% 87% 77%	77% ip 2-g 76% 76% 76% 76% 76% 76% 75% 75% 75% 77%	94% 59% ip sw_2-g 6 6 68% 66% 84% 59% 82% 83% 97%	94% 59% ip sw_2_3-t 59% 72% 65% 86% 59% 80% 97%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	53% 75% 79% t w/ s sw 96% 76% 99% 99% 99% 69% 68% 100% 86%	37% 75% 76% t w/ s 62% 75% 77% 64% 77% 64% 77% 76% 50% 82%	$\begin{array}{c c} 61\% \\ \hline 75\% \\ 89\% \\ \hline sw_2 \\ 96\% \\ \hline 75\% \\ 78\% \\ 78\% \\ \hline 78\% \\ 78\% \\ 99\% \\ 64\% \\ 99\% \\ 86\% \end{array}$	$\begin{array}{c c} \hline 79\% \\ \hline 88\% \\ \hline {\bf t w/s} \\ \hline {\bf sw_2_3-e} \\ 96\% \\ \hline 75\% \\ \hline 78\% \\ \hline 71\% \\ 99\% \\ \hline 64\% \\ \hline 74\% \\ \hline 99\% \\ \hline 87\% \end{array}$	92% 59% ip g sw 76% 50% 75% 85% 67% 87% 87% 87% 93%	77% ip 2-g 0 76% 0 76% 0 75% 0 75% 0 75% 0 75% 0 75% 0 75% 0 75% 0 75% 0 75% 0 75% 0 75% 0 75% 0 78%	94% 59% ip sw_2-g 76% 68% 66% 84% 59% 83% 97% 93%	94% 59% sw_2_3-t 59% 72% 65% 86% 59% 97% 93%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Aman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	53% 75% 79% t w/ s sw 96% 76% 97% 99% 69% 68% 68% 100% 86% 97%	37% 75% 76% tw/s 2-g 62% 75% 77% 64% 77% 64% 77% 82% 77%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline 88\% \\ \hline {\bf t w/s} \\ sw_2 3-g \\ 96\% \\ \hline 75\% \\ \hline 75\% \\ \hline 78\% \\ \hline 71\% \\ 99\% \\ 64\% \\ \hline 74\% \\ 99\% \\ 87\% \\ 96\% \end{array}$	92% 59% ip 5 sw 76% 50% 75% 85% 67% 87% 93% 77% 93% 76%	77% ip 2-g 0 76% 2-g 0 76% 82% 77% 0 75% 0 75% 0 75% 0 75% 77% 0 77% 0 77% 0 77% 0 77% 0 77% 0 77% 0 77% 0 77% 0 77% 0 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75% <td>94% 59% ip sw_2-g 76% 68% 66% 84% 59% 82% 83% 97% 93% 55%</td> <td><math display="block">\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline \mathbf{ip} \\ \mathbf{sw}_2 \ 3_{-1} \\ 55\% \\ \hline 72\% \\ 65\% \\ 86\% \\ 59\% \\ 88\% \\ 80\% \\ 97\% \\ 93\% \\ 67\% \end{array}</math></td>	94% 59% ip sw_2-g 76% 68% 66% 84% 59% 82% 83% 97% 93% 55%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline \mathbf{ip} \\ \mathbf{sw}_2 \ 3_{-1} \\ 55\% \\ \hline 72\% \\ 65\% \\ 86\% \\ 59\% \\ 88\% \\ 80\% \\ 97\% \\ 93\% \\ 67\% \end{array}$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	$\begin{array}{c c} & 53\% \\ \hline & 75\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline & t \ w/\ s \\ & sw \\ 96\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 69\% \\ 68\% \\ 100\% \\ 86\% \\ 100\% \\ 86\% \\ 100\% \\ 86\% \\ 77\% \\ 73\% \\ 75\% \end{array}$	37% 75% 76% 2-g 62% 75% 64% 77% 64% 77% 64% 77% 50% 82% 77% 69% 72% 69% 72% 69% 77%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline 88\% \\ \hline {\bf t} {\bf w}/{\bf s} \\ \hline {\bf sw}_2 \ {\bf 3-g} \\ 96\% \\ \hline 75\% \\ \hline 78\% \\ \hline 71\% \\ 99\% \\ \hline 64\% \\ \hline 64\% \\ \hline 74\% \\ 99\% \\ \hline 87\% \\ \hline 96\% \\ \hline 72\% \\ \hline 62\% \\ \hline 77\% \\ \hline 43\% \\ \hline 79\% \end{array}$	92% 59% ip 5 sw 76% 50% 50% 59% 67% 87% 77% 93% 76% 74% 75% 72% 67% 81%	77% 77% 77% 2-g 0 76% 70% 75% 0 75% 0 75% 0 75% 0 77% 0 77% 0 77% 0 77% 0 78% 0 78% 0 78% 0 78% 0 85% 0 61% 0 53%	94% 59% ip sw_2sg 76% 66% 66% 84% 59% 97% 93% 55% 73% 73% 73% 84% 433% 85%	$\begin{array}{c c} 94\% \\ \hline 94\% \\ \hline 59\% \\ \hline \mathbf{ip} \\ \mathbf{sw} 2 \ \mathbf{3-}_{7} \\ 59\% \\ \hline 72\% \\ \hline 65\% \\ 86\% \\ \hline 59\% \\ 83\% \\ 80\% \\ 97\% \\ 93\% \\ \hline 67\% \\ \hline 74\% \\ 83\% \\ 84\% \\ \hline 48\% \\ \hline 75\% \\ \end{array}$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram	$\begin{array}{c} 53\% \\ 75\% \\ 75\% \\ 79\% \\ \hline t w/s \\ 96\% \\ 96\% \\ 97\% \\ 99\% \\ 99\% \\ 99\% \\ 69\% \\ 68\% \\ 100\% \\ 86\% \\ 97\% \\ 92\% \\ 62\% \\ 77\% \\ 73\% \\ 75\% \\ 83\% \\ 72\% \end{array}$	37% 75% 76% 2-g 62% 75% 77% 77% 64% 77% 76% 76% 76% 77% 72% 69% 77% 72% 69% 77% 77% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & {\bf t} \ {\bf w}/\ {\bf s} \\ \hline & {\bf sw}_2\ {\bf 3}-{\bf g} \\ 96\% \\ \hline & 75\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 77\% \\ \hline & 99\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 43\% \\ \hline & 79\% \\ \hline & 63\% \\ \hline & 62\% \\ \hline \end{array}$	92% 59% ip g sw 76% 50% 75% 85% 93% 76% 77% 93% 76% 77% 85% 77% 85% 85% 75% 85% 75% 80%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline ip \\ sw_2_3. \\ 59\% \\ \hline 72\% \\ 65\% \\ 86\% \\ 59\% \\ 88\% \\ 80\% \\ 97\% \\ 93\% \\ 67\% \\ 67\% \\ 84\% \\ 74\% \\ 84\% \\ 75\% \\ 67\% \\ 80\% \\ \end{array}$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah	$\begin{array}{c c} & 53\% \\ & 75\% \\ \hline & 79\% \\ \hline \mathbf{t} \ \mathbf{w}/ \ \mathbf{s} \\ & \mathbf{sw} \\ 96\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 69\% \\ 66\% \\ 66\% \\ 100\% \\ 86\% \\ 100\% \\ 86\% \\ 100\% \\ 86\% \\ 77\% \\ 92\% \\ 62\% \\ 77\% \\ 73\% \\ 75\% \\ 83\% \\ 72\% \\ 53\% \\ 99\% \\ \end{array}$	37% 75% 76% 2-g 62% 75% 64% 77% 64% 77% 64% 77% 50% 82% 77% 69% 72% 69% 72% 69% 77% 62% 76% 82% 77% 69%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & {\bf tw/s} \\ 88\% \\ \hline & {\bf sw_2_3-e} \\ 96\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ 99\% \\ \hline & 64\% \\ \hline & 74\% \\ 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 67\% \\ \hline & 72\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 43\% \\ \hline & 79\% \\ \hline & 63\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \end{array}$	92% 59% ip g sw 76% 50% 75% 85% 59% 67% 77% 93% 77% 93% 76% 74% 74% 81% 72% 81% 72% 52% 72%	77% 77% 77% 19 2-5g 76% 77% 82% 77% 82% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 78% 61% 51% 78% 77% 78% 77% 78% 77% 78% 77% 78% 77% 77% 78% 78% 78% 78% 78% 78%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa	$\begin{array}{c c} 53\% \\ 75\% \\ 79\% \\ \hline t w/s \\ sw \\ 96\% \\ 97\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 69\% \\ 68\% \\ 100\% \\ 86\% \\ 100\% \\ 86\% \\ 77\% \\ 72\% \\ 53\% \\ 99\% \\ 74\% \\ 99\% \\ 99\% \\ \end{array}$	37% 75% 76% 2-g 62% 75% 64% 77% 64% 77% 64% 77% 64% 77% 64% 77% 69% 72% 69% 77% 62% 77% 62% 77% 62% 77% 79% 94%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & {\bf t} \ {\bf w} / \ {\bf s} \\ \hline & {\bf sw} _ 2 _ 3 - {\bf g} \\ 96\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 87\% \\ \hline & 96\% \\ \hline & 72\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 87\% \\ \hline \end{array}$	92% 59% ip 59% 75% 50% 75% 59% 67% 85% 79% 74% 72% 67% 74% 74% 72% 72% 72% 72% 72% 92% 92% 92% 84%	77% 77% 77% 77% 2-5g 76% 75% 75% 75% 77% 82% 77% 82% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 69% 77% 69% 77% 69% 77% 69% 75% 82% 75% 82% 75% 82% 75% 82% 75% 82% 82% 82% 82% 82% 82% 74%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain	$\begin{array}{c c} & 53\% \\ & 75\% \\ \hline 75\% \\ \hline 79\% \\ \hline t w/s \\ & sw \\ 96\% \\ 99\% \\ 99\% \\ 99\% \\ 69\% \\ 68\% \\ 100\% \\ 86\% \\ 97\% \\ 62\% \\ 77\% \\ 62\% \\ 77\% \\ 75\% \\ 83\% \\ 72\% \\ 53\% \\ 99\% \\ 99\% \\ 92\% \\ 99\% \\ 92\% \\ 99\% \\ 92\% \end{array}$	37% 75% 76% 2-g 62% 75% 77% 64% 77% 76% 50% 82% 77% 76% 82% 77% 45% 77% 62% 76% 83% 96% 97% 79% 94% 77%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & {\bf t} \ {\bf w} / \ {\bf s} \\ \hline & {\bf s} \ {\bf w} _ 2 \ {\bf 3} - {\bf g} \\ 96\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 88\% \\ \hline & 87\% \\ \hline & 75\% \\ \end{array}$	92% 59% 59% sw 76% 50% 75% 85% 59% 67% 73% 73% 77% 93% 76% 77% 93% 76% 72% 72% 72% 72% 72% 72% 72% 72% 72% 72% 81% 82% 84% 82%	77% 77% 77% 2-5g 76% 77% 82% 77% 82% 77% 75% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 69% 61% 53% 82% 77% 82% 77% 82% 77% 87% 87% 87% 77% 87% 87% 87% 77% 87% 77% 87% 77% 77% <td>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</td> <td>$\begin{array}{r c c c c c c c c c c c c c c c c c c c$</td>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c c} & 53\% \\ & 75\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline & 76\% \\ 96\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 69\% \\ 68\% \\ 100\% \\ 68\% \\ 100\% \\ 62\% \\ 77\% \\ 72\% \\ 53\% \\ 99\% \\ 92\% \\ 99\% \\ 92\% \\ 99\% \\ 92\% \\ 90\% \\ 92\% \\ 90\% \\ 64\% \\ \end{array}$	37% 75% 76% 2-g 62% 75% 64% 77% 64% 77% 64% 77% 76% 70% 82% 77% 72% 69% 77% 72% 69% 77% 72% 69% 77% 72% 69% 77% 72% 70% 70% 70%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & t \ w/ \ s \\ \hline & sw_2 \ -3 - g \\ 96\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 64\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 71\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 75\% \\ \hline & 100\% \\ \hline & 51\% \end{array}$	92% 59% ip 5 sw 76% 50% 75% 85% 59% 67% 87% 77% 93% 76% 87% 77% 87% 77% 87% 76% 87% 77% 87% 77% 87% 77% 87% 87	77% 77% 77% 2-5 2-6 76% 77% 82% 75% 77% 82% 75% 77% 82% 77% 82% 77% 82% 78% 669% 61% 85% 61% 75% 77% 85% 61% 75% 77% 82% 75% 77% 82% 75% 74% 79% 79% 76%	94% 59% ip sw_2-g 576% 667% 598% 598% 666% 84% 597% 598% 678% 597% 93% 573% 73% 73% 73% 73% 685% 677% 680% 52% 75% 83% 90% 79% 82% 90% 79% 82% 687% 79% 82% 687% 90% 79% 82% 687%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c} & 53\% \\ & 75\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline & 76\% \\ 96\% \\ & 97\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 90\% \\ 66\% \\ \hline & 68\% \\ 100\% \\ 66\% \\ \hline & 68\% \\ \hline & 100\% \\ 66\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 73\% \\ \hline & 75\% \\ \hline & 83\% \\ \hline & 72\% \\ \hline & 53\% \\ \hline & 99\% \\ 99\% \\ 92\% \\ 99\% \\ 92\% \\ \hline & 99\% \\ 92\% \\ \hline & 99\% \\ 92\% \\ \hline & 53\% \\ \hline \end{array}$	37% 75% 76% 2-g 62% 75% 75% 77% 64% 77% 76% 50% 77% 77% 76% 82% 77% 77% 76% 82% 77% 76% 83% 96% 97% 77% 76% 77% 70% 70% 70% 88%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & \mathbf{t} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & \mathbf{s} \ \mathbf{w} / \ \mathbf{s} \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 88\% \\ \hline & 87\% \\ \hline & 75\% \\ \hline & 100\% \\ \hline & 51\% \\ \hline \end{array}$	92% 59% ip 5 sw 76% 50% 75% 85% 67% 87% 77% 93% 76% 77% 93% 76% 77% 93% 76% 72% 72% 67% 81% 72% 82% 72% 82% 72% 72% 72% 72% 75% 81% 81% 76% 75% 81% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 85% 76% 75% 76% 75% 76% 76% 76% 76% 76% 76% 76% 76	77% 77% 77% 10 2-5g 76% 75% 75% 75% 75% 75% 75% 77% 82% 75% 75% 77% 85% 69% 63% 51% 82% 51% 82% 51% 78% 78% 78% 78% 78% 78% 78% 77% 87% 74% 79% 76% 76% 77%	94% 59% ip sw_2sg 76% 68% 666% 84% 59% 83% 97% 93% 55% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73% 73% 84% 83% 6433% 52% 75% 83% 90% 75% 83% 90% 79% 82% 83% 83% 90% 79% 82% 60% 60% 60% 60% 60%	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} & 53\% \\ & 75\% \\ \hline & 75\% \\ \hline & 79\% \\ \hline & w/s \\ & sw \\ & 96\% \\ & 96\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 69\% \\ & 68\% \\ & 100\% \\ & 66\% \\ & 86\% \\ & 97\% \\ & 92\% \\ & 92\% \\ & 92\% \\ & 53\% \\ & 72\% \\ & 72\% \\$	37% 75% 76% 2-g 62% 75% 77% 64% 77% 76% 77% 76% 82% 77% 72% 69% 82% 77% 72% 69% 77% 72% 69% 77% 76% 83% 77% 79% 79% 79% 79% 79% 70% 62% 75% 76% 75% 76% 76% 75% 75% 75% 75% 75% 75% 75% 75% 75% 75	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & {\bf t} \ {\bf w} / \ {\bf s} \\ \hline & {\bf s} \ {\bf w} _ 2 \ {\bf . s} \\ 96\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 75\% \\ \hline & 100\% \\ \hline & 51\% \\ \hline & 86\% \\ \hline & 67\% \\ \hline \end{array}$	92% 59% ip 5 sw 76% 50% 75% 59% 67% 85% 77% 93% 76% 77% 93% 76% 72% 67% 81% 72% 81% 81% 72% 81% 84% 84% 82% 78% 79% 79% 75% 82% 78% 75% 75% 75% 77% 79% 77% 79% 75% 75% 75% 75% 77% 77% 77% 77	77% 77% 77% 10 2-5g 76% 77% 82% 77% 77% 77% 82% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 78% 61% 53% 61% 53% 78% 78% 78% 78% 77% 87% 78% 79% 79% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c c} & 53\% \\ & 75\% \\ \hline & 75\% \\ \hline & 79\% \\ \hline & w/s \\ & sw \\ 96\% \\ 97\% \\ 99\% \\ 99\% \\ 99\% \\ 69\% \\ 66\% \\ 97\% \\ 92\% \\ 62\% \\ 77\% \\ 73\% \\ 75\% \\ 83\% \\ 72\% \\ 53\% \\ 99\% \\ 92\% \\ 99\% \\ 92\% \\ 99\% \\ 92\% \\ 100\% \\ 64\% \\ 53\% \\ 72\% \\ 50\% \\ \end{array}$	37% 75% 76% 2-g 62% 75% 64% 77% 76% 50% 82% 77% 76% 76% 77% 72% 69% 77% 62% 83% 96% 97% 94% 77% 79% 79% 79% 79% 70% 68% 53%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & t \ w/ \ s \\ \hline & sw_2 \ -3 - g \\ 96\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 63\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 88\% \\ \hline & 87\% \\ \hline & 75\% \\ \hline & 100\% \\ \hline & 51\% \\ \hline & 86\% \\ \hline & 67\% \\ \hline & 95\% \\ \end{array}$	92% 59% ip 5% 5% 76% 50% 75% 85% 67% 87% 77% 93% 77% 77% 87% 77% 87% 72% 72% 72% 81% 72% 88% 88% 75% 75% 88% 75% 75% 87% 87% 87% 87% 87% 87% 87% 87	77% 77% 77% 2-5g 76% 70% 75% 75% 75% 77% 75% 77% 50% 77% 77% 77% 77% 77% 76% 76% 76% 85% 61% 75% 82% 51% 77% 87% 75% 87% 75% 87% 75% 87% 75% 87% 74% 75% 77% 56% 77% 55%	94% 59% ip sw_2-g 5 6 66% 84% 59% 83% 97% 83% 97% 83% 97% 83% 6 73% 55% 73% 84% 85% 67% 83% 680% 52% 75% 83% 90% 73% 83% 60% 72% 835%	$\begin{array}{c c} 94\% \\ \hline & 94\% \\ \hline & 59\% \\ \hline & ip \\ sw_2_3-i \\ 65\% \\ \hline & 65\% \\ \hline & 86\% \\ \hline & 59\% \\ \hline & 72\% \\ \hline & 67\% \\ \hline & 83\% \\ \hline & 97\% \\ \hline & 97\% \\ \hline & 93\% \\ \hline & 67\% \\ \hline & 74\% \\ \hline & 83\% \\ \hline & 84\% \\ \hline & 75\% \\ \hline & 67\% \\ \hline & 80\% \\ \hline & 52\% \\ \hline & 75\% \\ \hline & 75\% \\ \hline & 75\% \\ \hline & 75\% \\ \hline & 77\% \\ \hline & 83\% \\ \hline & 79\% \\ \hline & 35\% \\ \hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Aman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} & 53\% \\ & 75\% \\ \hline & 75\% \\ \hline & 79\% \\ \hline & w/s \\ & sw \\ & 96\% \\ & 96\% \\ & 99\% \\ & 99\% \\ & 99\% \\ & 69\% \\ & 68\% \\ & 100\% \\ & 66\% \\ & 86\% \\ & 97\% \\ & 92\% \\ & 92\% \\ & 92\% \\ & 53\% \\ & 72\% \\ & 72\% \\$	37% 75% 76% 2-g 62% 75% 77% 64% 77% 76% 70% 76% 82% 77% 72% 69% 82% 77% 72% 69% 77% 72% 69% 77% 76% 83% 77% 79% 79% 79% 79% 79% 70% 62% 70% 76% 70% 70% 70% 70% 70% 70% 70% 70% 70% 70	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 79\% \\ \hline & 88\% \\ \hline & {\bf t} \ {\bf w} / \ {\bf s} \\ \hline & {\bf s} \ {\bf w} _ 2 \ {\bf . s} \\ 96\% \\ \hline & 75\% \\ \hline & 78\% \\ \hline & 71\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 64\% \\ \hline & 74\% \\ \hline & 99\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 77\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 62\% \\ \hline & 80\% \\ \hline & 75\% \\ \hline & 100\% \\ \hline & 51\% \\ \hline & 86\% \\ \hline & 67\% \\ \hline \end{array}$	92% 59% ip 5 sw 76% 50% 75% 59% 67% 85% 77% 93% 76% 77% 93% 76% 72% 67% 81% 72% 81% 81% 72% 81% 84% 84% 82% 78% 79% 79% 75% 82% 78% 75% 75% 75% 77% 79% 77% 79% 75% 75% 75% 75% 77% 77% 77% 77	77% 77% 77% 77% 2-5g 76% 75% 75% 75% 75% 75% 75% 77% 82% 77% 78% 77% 78% 78% 69% 82% 61% 85% 61% 75% 77% 82% 61% 75% 82% 75% 82% 81% 82% 75% 82% 75% 82% 77% 83% 77% 78% 77% 83% 77% 76% 77% 76% 77% 76% 77%	94% 59% ip sw_2rg 76% 66% 66% 84% 59% 83% 97% 83% 97% 83% 97% 83% 97% 83% 73% 78% 84% 83% 67% 80% 52% 75% 83% 97% 82% 87% 90% 79% 82% 87% 60% 72% 72% 71%	$\begin{array}{c c} 94\% \\ \hline & 94\% \\ \hline & 59\% \\ \hline & sw_2 3-4 \\ 59\% \\ \hline & 72\% \\ 65\% \\ \hline & 65\% \\ \hline & 86\% \\ \hline & 59\% \\ \hline & 83\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 93\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 93\% \\ \hline & 80\% \\ \hline & 97\% \\ \hline & 80\% \\ \hline & 74\% \\ \hline & 80\% \\ \hline & 74\% \\ \hline & 80\% \\ \hline & 77\% \\ \hline & 67\% \\ \hline & 80\% \\ \hline & 52\% \\ \hline & 76\% \\ \hline & 82\% \\ \hline & 79\% \\ \hline & 83\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline & 79\% \\ \hline \end{array}$

C.3.5 Bing/BRF

Table C.18: Per level and query macro F-measure when using BRF benchmarks for Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	37%	38%	42%	42%	51%	42%	51%	51%
Adnan Ibrahim	49%	59%	56%	77%	39%	42%	76%	63%
Amman	85%	37%	59%	59%	40%	42%	40%	40%
Jarrar	42%	40%	42%	42%	46%	36%	42%	42%
Alishaa'	60%	38%	66%	66%	37%	40%	59%	66%
Nahawnd	49%	45%	55%	40%	95%	45%	93%	93%
Qersh	37%	35%	37%	37%	95%	44%	88%	88%
Asia	38%	38%	66%	52%	96%	60%	93%	93%
Shir (Shi3r)	68%	40%	63%	63%	42%	40%	42%	42%
Arafat	45%	44%	44%	44%	56%	47%	49%	49%
Cameron	39%	35%	39%	39%	61%	54%	62%	57%
Maliki	56%	22%	28%	30%	43%	27%	43%	43%
Bagara	42%	47%	55%	55%	51%	39%	71%	71%
Sakhr	52%	33%	48%	48%	48%	48%	46%	46%
						48%		
Iqteran	51%	38%	45%	45%	87%		87%	86%
Aziz	87%	76%	89%	89%	92%	90%	91%	91%
Ahram	49%	38%	49%	49%	57%	49%	57%	57%
Jalamah	49%	40%	55%	55%	58%	42%	62%	62%
Malek Abdullah	90%	81%	61%	64%	98%	100%	98%	98%
Jamaa Arabiya	40%	38%	94%	94%	87%	80%	92%	89%
Sakakini	54%	44%	38%	38%	87%	49%	88%	88%
Bursa	82%	38%	76%	71%	97%	44%	100%	100%
Ain	40%	38%	69%	66%	53%	36%	40%	40%
Thaheryah	51%	40%	42%	42%	84%	40%	47%	52%
Tarablus	65%	38%	47%	44%	88%	45%	99%	98%
Azhar	49%	47%	48%	48%	48%	44%	48%	48%
		38%	73%	73%	91%	40%	66%	66%
	620%							
Arabiyah	63%							0.007
Asad	83%	26%	31%	30%	63%	41%	40%	60%
Asad Athraa'	83% 100%	26% 38%	31% 100%	30% 100%	63% 97%	41% 40%	40% 97%	97%
Asad	83% 100% 99%	26% 38% 37%	31% 100% 86%	30% 100% 87%	63% 97% 78%	41% 40% 40%	40% 97% 63%	97% 63%
Asad Athraa' Qedra	83% 100%	26% 38% 37% t w/ s	31% 100% 86% tw/s	30% 100% 87% t w/ s	63% 97% 78% ip	41% 40% 40% ip	40% 97% 63% ip	97% 63% ip
Asad Athraa' Qedra Dataset (Query)	83% 100% 99% t w/ s sw	26% 38% 37% t w/ s 2-g	31% 100% 86% t w/s sw_2-g	30% 100% 87% t w/ s sw_2_3-	63% 97% 78% ip g sw	41% 40% 40% ip 2-g	40% 97% 63% ip sw_2-g	97% 63% ip sw_2_3-
Asad Athraa' Qedra Dataset (Query) Amazon	83% 100% 99% t w/ s sw 90%	26% 38% 37% t w/ s 2-g 42%	31% 100% 86% tw/s sw_2-g 90%	30% 100% 87% t w/ s ; sw_2_3- 90%	63% 97% 78% ip g sw 68%	41% 40% 40% ip 2-g 39%	40% 97% 63% ip sw_2-g 48%	97% 63% ip sw_2_3 - 48%
Asad Athraa' Qedra Dataset (Query)	83% 100% 99% t w/ s sw 90% 49%	26% 38% 37% t w/ s 2-g 42% 62%	31% 100% 86% tw/s sw_2-g 90% 64%	30% 100% 87% t w/ s ; sw_2_3-; 90% 57%	63% 97% 78% ip g sw 68% 39%	41% 40% 40% ip 2-g 39% 39%	40% 97% 63% ip sw_2-g	97% 63% ip sw_2_3- 48% 49%
Asad Athraa' Qedra Dataset (Query) Amazon	83% 100% 99% t w/ s sw 90%	26% 38% 37% t w/ s 2-g 42%	31% 100% 86% tw/s sw_2-g 90%	30% 100% 87% t w/ s ; sw_2_3- 90%	63% 97% 78% ip g sw 68%	41% 40% 40% ip 2-g 39% 39%	40% 97% 63% ip sw_2-g 48%	97% 63% ip sw_2_3- 48%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	83% 100% 99% t w/ s sw 90% 49%	26% 38% 37% t w/ s 2-g 42% 62%	31% 100% 86% tw/s sw_2-g 90% 64%	30% 100% 87% t w/ s ; sw_2_3-; 90% 57%	63% 97% 78% ip g sw 68% 39%	41% 40% 40% ip 2-g 39% 39% 39% 44%	40% 97% 63% ip sw_2-g 48% 49%	97% 63% ip sw_2_3- 48% 49%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	83% 100% 99% t w/ s sw 90% 49% 92%	26% 38% 37% t w/ s 2-g 42% 62% 42%	31% 100% 86% tw/s sw_2-g 90% 64% 92%	30% 100% 87% t w/ s sw_2_3 90% 57% 92%	63% 97% 78% ip g sw 68% 39% 59%	41% 40% 40% ip 2-g 39% 39% 39% 44% 37%	40% 97% 63% ip sw_2-g 48% 49% 59%	97% 63% ip sw_2_3- 48% 49% 60%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	83% 100% 99% t w/ s sw 90% 49% 92% 42%	26% 38% 37% t w/ s 2-g 42% 62% 42%	31% 100% 86% tw/s sw_2-g 90% 64% 92% 42%	30% 100% 87% 5 sw_2_3- 90% 57% 92% 42%	63% 97% 78% ip g sw 68% 39% 59% 54%	41% 40% ip 2-g 39% 39% 44% 37% 59%	40% 97% 63% ip sw_2-g 48% 49% 59% 54%	97% 63% ip sw_2_3- 48% 49% 60% 55% 78%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	83% 100% 99% t w/ s sw 90% 49% 92% 42% 98% 98%	26% 38% 37% t w/ s 2-g 42% 62% 42% 42% 54%	31% 100% 86% t w/ s sw_2-g 90% 64% 92% 42% 76% 97%	30% 100% 87% tw/s ; sw_2_3-; 90% 57% 42% 76% 97%	63% 97% 78% ip g sw 68% 39% 59% 54% 95% 36%	41% 40% 40% 2-g 39% 39% 44% 37% 59% 59%	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36%	$\begin{array}{c c} 97\% \\\hline 63\% \\\hline \mathbf{ip} \\ \mathbf{sw_2_3-} \\ 48\% \\\hline 49\% \\\hline 60\% \\\hline 55\% \\\hline 78\% \\\hline 36\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	83% 100% 99% t w/ s sw 90% 49% 92% 42% 98%	26% 38% 37% t w/ s 2-g 42% 62% 42% 45% 54% 39%	31% 100% 86% tw/s sw_2-g 90% 64% 92% 42% 76%	30% 100% 87% tw/s sw_2_3- 90% 57% 92% 42% 76% 97% 97%	63% 97% 78% ip g sw 68% 39% 59% 54% 95% 36% 42%	41% 40% 40% 2-g 39% 39% 44% 59% 59% 59% 36%	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36% 49%	$\begin{array}{c c} 97\% \\\hline 63\% \\\hline \mathbf{ip} \\\hline \mathbf{sw_2_3-} \\\hline 48\% \\\hline 49\% \\\hline 60\% \\\hline 55\% \\\hline 78\% \\\hline 36\% \\\hline 51\% \\\end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	83% 100% 99% t w/ s sw 90% 49% 92% 42% 98% 96% 96% 97% 100%	26% 38% 37% t w/ s 2-g 42% 62% 42% 54% 39% 58%	$\begin{array}{c c} 31\% \\ \hline 100\% \\ 86\% \\ \hline t w/s \\ sw_2-g \\ 90\% \\ 64\% \\ 92\% \\ 42\% \\ 76\% \\ 97\% \\ 97\% \\ 97\% \\ 100\% \\ \end{array}$	30% 100% 87% tw/s sw_2_3-; 90% 57% 42% 76% 97% 97% 77%	63% 97% 78% ip g sw 68% 39% 59% 54% 95% 36% 42% 67%	41% 40% 40% ip 2-g 39% 39% 44% 59% 59% 36% 73%	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36% 49% 90%	$\begin{array}{c c} 97\% \\\hline 63\% \\\hline ip \\ sw_2 3- \\ 48\% \\\hline 49\% \\\hline 60\% \\\hline 55\% \\\hline 78\% \\\hline 36\% \\\hline 51\% \\\hline 89\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	83% 100% 99% tw/s \$ \$ 90% 49% 92% 42% 98% 96% 96% 96%	26% 38% 37% t w/s 2-g 42% 42% 42% 45% 54% 39% 58% 42%	$\begin{array}{c c} 31\% \\ \hline 100\% \\ 86\% \\ \hline {\bf t} {\bf w/s} \\ {\bf sw_22g} \\ 90\% \\ 64\% \\ 92\% \\ 42\% \\ 76\% \\ 97\% \\ 100\% \\ 75\% \end{array}$	30% 100% 87% tw/s; sw_2_3-; 90% 57% 42% 76% 97% 77% 75%	63% 97% 78% ip g sw 68% 39% 59% 54% 95% 36% 42% 67% 70%	41% 40% 40% 2-g 39% 39% 44% 59% 59% 59% 59% 59% 59% 58% 36% 38%	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36% 49% 90% 68%	$\begin{array}{c c} 97\% \\\hline 63\% \\\hline ip \\ sw_2 3- \\ 48\% \\\hline 49\% \\\hline 60\% \\\hline 55\% \\\hline 78\% \\\hline 36\% \\\hline 51\% \\\hline 89\% \\\hline 68\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	$\begin{array}{c c} 83\% \\ \hline 83\% \\ 100\% \\ 99\% \\ \hline 99\% \\ \hline 99\% \\ 49\% \\ 92\% \\ 42\% \\ 92\% \\ 92\% \\ 92\% \\ 100\% \\ 96\% \\ 96\% \\ 96\% \\ 45\% \\ \end{array}$	26% 38% 37% t w/s 2-g 42% 42% 42% 45% 54% 58% 42% 44%	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline t w/s \\ 86\% \\ \hline sw_2-g \\ 90\% \\ \hline 64\% \\ 92\% \\ 42\% \\ \hline 76\% \\ 76\% \\ 97\% \\ 97\% \\ 100\% \\ 75\% \\ 45\% \\ \end{array}$	$\begin{array}{c} 30\% \\ 100\% \\ \hline 87\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{s} \ \mathbf{s} \\ \mathbf{s} \ \mathbf{s} \\ \mathbf{y} $	63% 97% 78% ip g sw 68% 39% 59% 54% 95% 36% 42% 67% 70% 86%	$\begin{array}{c c} 41\% \\ 40\% \\ 40\% \\ \hline \\ 40\% \\ \hline \\ 2-g \\ 39\% \\ 39\% \\ 39\% \\ 39\% \\ 544\% \\ 53\% \\ 55\% \\ 55\% \\ 36\% \\ 55\% \\ 36\% \\ 55\% \\ 38\% \\ 55\% \\ 55\% \\ \end{array}$	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36% 49% 59% 54% 79% 68% 87%	$\begin{array}{c c} 97\% \\\hline 63\% \\\hline \mathbf{ip} \\\mathbf{sw_2_3-} \\48\% \\\hline 49\% \\\hline 60\% \\\hline 55\% \\\hline 78\% \\\hline 36\% \\\hline 51\% \\\hline 89\% \\\hline 68\% \\\hline 87\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	$\begin{array}{c} 83\% \\ 100\% \\ 99\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw} \\ 90\% \\ 49\% \\ 92\% \\ 42\% \\ 98\% \\ 96\% \\ 96\% \\ 96\% \\ 96\% \\ 100\% \\ 96\% \\ 45\% \\ 62\% \end{array}$	$\begin{array}{c c} 26\% \\ \hline 38\% \\ \hline 37\% \\ \hline w/s \\ \hline 2 \cdot g \\ 42\% \\ \hline 42\% \\ 42\% \\ 42\% \\ \hline 45\% \\ 54\% \\ \hline 39\% \\ \hline 58\% \\ \hline 42\% \\ \hline 44\% \\ \hline 56\% \\ \end{array}$	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline t w/s \\ sw_2-g \\ 90\% \\ \hline 64\% \\ 92\% \\ 42\% \\ 76\% \\ 97\% \\ 97\% \\ 100\% \\ 75\% \\ 45\% \\ 63\% \\ \end{array}$	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ 87\% \\ \hline \mathbf{t} \mathbf{w/s} \\ \mathbf{s} \\ \mathbf{s} \\ \mathbf{y} \\ 23 \\ \mathbf{y} \\ 90\% \\ 92\% \\ 42\% \\ 76\% \\ 92\% \\ 42\% \\ 76\% \\ 97\% \\ 97\% \\ 97\% \\ 57\% \\ 45\% \\ 57\% \end{array}$	63% 97% 78% ip g sw 68% 39% 59% 55% 95% 95% 42% 67% 70% 86% 64%	$\begin{array}{c c} 41\% \\ 40\% \\ 40\% \\ \hline \\ 40\% \\ \hline \\ 2-g \\ 39\% \\ 39\% \\ 39\% \\ 39\% \\ 44\% \\ 55\% \\ 55\% \\ 55\% \\ 36\% \\ 55\% \\ 38\% \\ 56\% \\ 63\% \\ 63\% \\ \end{array}$	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36% 49% 90% 68% 87% 37%	$\begin{array}{c c} 97\% \\\hline 63\% \\\hline ip \\ sw_2_3- \\\hline 48\% \\\hline 49\% \\\hline 60\% \\\hline 55\% \\\hline 78\% \\\hline 36\% \\\hline 51\% \\\hline 89\% \\\hline 68\% \\\hline 64\% \\\hline 64\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	83% 100% 99% t w/ s sw 90% 49% 92% 42% 98% 96% 96% 96% 96% 45% 62% 98%	$\begin{array}{c} 26\% \\ 38\% \\ 37\% \\ t w/s \\ 2-g \\ 42\% \\ 62\% \\ 42\% \\ 45\% \\ 54\% \\ 39\% \\ 42\% \\ 45\% \\ 58\% \\ 42\% \\ 44\% \\ 56\% \\ 52\% \end{array}$	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline t w/s \\ sw_2 2 g \\ 90\% \\ 64\% \\ 92\% \\ 42\% \\ 76\% \\ 97\% \\ 97\% \\ 97\% \\ 100\% \\ 75\% \\ 45\% \\ 63\% \\ 98\% \end{array}$	30% 100% 87% tw/s sw_2_3-; 90% 57% 92% 42% 76% 97% 77% 75% 45% 57% 98%	63% 97% 78% 97% 78% 97% 68% 95% 59% 54% 95% 36% 42% 67% 64% 64% 43%	41% 40% 40% 9 2-g 39% 39% 39% 39% 39% 39% 39% 39% 39% 39% 39% 59% 59% 58% 55% 52% 63% 33%	$\begin{array}{c c} 40\% \\ \hline & 40\% \\ 97\% \\ \hline & 63\% \\ \hline & 63\% \\ \hline & 63\% \\ \hline & 97\% \\ 54\% \\ 49\% \\ 49\% \\ 49\% \\ 90\% \\ 68\% \\ 87\% \\ 87\% \\ 37\% \\ 44\% \\ \end{array}$	$\begin{array}{c c} 97\% \\\hline & 63\% \\\hline & ip \\ 8w_2 3- \\ 48\% \\\hline 49\% \\\hline 60\% \\\hline 55\% \\\hline 78\% \\\hline 36\% \\\hline 55\% \\\hline 89\% \\\hline 68\% \\\hline 87\% \\\hline 64\% \\\hline 55\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	$\begin{array}{c} 83\%\\ 100\%\\ 99\%\\ \hline 80\%\\ 99\%\\ 49\%\\ 90\%\\ 49\%\\ 92\%\\ 42\%\\ 98\%\\ 98\%\\ 96\%\\ 96\%\\ 96\%\\ 96\%\\ 45\%\\ 62\%\\ 62\%\\ 56\%\\ \hline \end{array}$	26% 38% 37% t w/ s 2-g 42% 62% 42% 42% 45% 54% 39% 42% 44% 56% 25% 40%	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline sw_2-g \\ 90\% \\ \hline 64\% \\ 92\% \\ 42\% \\ 76\% \\ 76\% \\ 75\% \\ 100\% \\ 100\% \\ 63\% \\ 98\% \\ 54\% \end{array}$	$\begin{array}{c} 30\% \\ 100\% \\ \hline 87\% \\ \hline t w/s \\ s \\ s \\ 57\% \\ \hline 99\% \\ 57\% \\ 92\% \\ 42\% \\ 76\% \\ 92\% \\ 42\% \\ 76\% \\ 77\% \\ 77\% \\ 75\% \\ 45\% \\ 57\% \\ 98\% \\ 54\% \\ 54\% \end{array}$	63% 97% 78% 97% 78% 97% 78% 95% 39% 59% 54% 95% 36% 42% 67% 70% 86% 64% 43% 56%	$\begin{array}{c c} 41\% \\ \hline 40\% \\ \hline 40\% \\ \hline 40\% \\ \hline 2 \text{-g} \\ 5 39\% \\ \hline 39\% \\ 5 39\% \\ 5 39\% \\ \hline 559\% \\ 5 59\% \\ \hline 559\% \\ \hline 37\% \\ 5 38\% \\ \hline 52\% \\ \hline 6 338\% \\ \hline 6 33\% \\ \hline 6 40\% \end{array}$	40% 97% 63% ip sw_2-g 49% 59% 54% 79% 36% 49% 59% 54% 79% 36% 49% 50% 54% 79% 36% 49% 50% 68% 87% 37% 44% 51%	$\begin{array}{c c} 97\% \\\hline & 63\% \\\hline & \mathbf{ip} \\\hline & \mathbf{sw_2_3-} \\\hline & \mathbf{sw_4\%} \\\hline & 49\% \\\hline & 60\% \\\hline & 55\% \\\hline & 78\% \\\hline & 55\% \\\hline & 78\% \\\hline & 66\% \\\hline & 87\% \\\hline & 64\% \\\hline & 55\% \\\hline & 56\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	$\begin{array}{c} 83\%\\ 100\%\\ 99\%\\ \hline 80\%\\ 99\%\\ t w/s\\ sw\\ 90\%\\ 49\%\\ 92\%\\ 42\%\\ 98\%\\ 96\%\\ 96\%\\ 100\%\\ 96\%\\ 45\%\\ 62\%\\ 98\%\\ 56\%\\ 49\%\\ \end{array}$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 42% 54% 54% 58% 42% 56% 25% 40% 42%	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c} 30\% \\ 100\% \\ \hline 100\% \\ 87\% \\ \hline 87\% \\ \hline 97\% \\ 90\% \\ 57\% \\ 92\% \\ 92\% \\ 42\% \\ 92\% \\ 42\% \\ 76\% \\ 97\% \\ 97\% \\ 77\% \\ 75\% \\ 45\% \\ 57\% \\ 45\% \\ 54\% \\ 54\% \\ 46\% \end{array}$	63% 97% 78% g sw 68% 59% 59% 54% 95% 36% 42% 67% 64% 64% 43% 56% 71%	$\begin{array}{c c} 41\% \\ 40\% \\ 40\% \\ \hline \\ 40\% \\ \hline \\ 9 \\ 2 \\ -g \\ 39\% \\ 39\% \\ 39\% \\ 39\% \\ 39\% \\ 39\% \\ 39\% \\ 54\% \\ 55\% \\ 55\% \\ 55\% \\ 56\% \\ 56\% \\ 36\% \\ 38\% \\ 52\% \\ 66\% \\ 33\% \\ 55\% \\ $	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36% 49% 90% 68% 87% 37% 51% 73%	$\begin{array}{c c} 97\% \\ \hline & 63\% \\ \hline & ip \\ sw_2 3 \\ \hline & 48\% \\ 49\% \\ 49\% \\ 49\% \\ 60\% \\ 55\% \\ 78\% \\ 36\% \\ 55\% \\ 87\% \\ 66\% \\ 87\% \\ 66\% \\ 68\% \\ \hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	$\begin{array}{c} 83\%\\ 100\%\\ 99\%\\ \hline 100\%\\ 99\%\\ \hline 100\%\\ 90\%\\ 49\%\\ 92\%\\ 42\%\\ 98\%\\ 96\%\\ 96\%\\ 96\%\\ 96\%\\ 96\%\\ 45\%\\ 62\%\\ 98\%\\ 56\%\\ 56\%\\ 49\%\\ 90\%\\ \end{array}$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 44% 54% 58% 25% 40% 42% 42% 58% 25%	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline t w/s \\ 8w_2-g \\ 90\% \\ \hline 64\% \\ 92\% \\ 42\% \\ 76\% \\ 97\% \\ 97\% \\ 97\% \\ 97\% \\ 100\% \\ 75\% \\ 45\% \\ 63\% \\ 98\% \\ 54\% \\ 88\% \end{array}$	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ 87\% \\ \hline $ sw_2_3-; \\ $ sw_2_3-; \\ $ $90\% \\ $ $ $7\% \\ $ $92\% \\ $ $ $42\% \\ $ $ $7\% \\ $ $ $ $97\% \\ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $	63% 97% 78% ip g sw 68% 39% 59% 59% 66% 70% 66% 64% 42% 67% 70% 86% 64% 43% 56% 76% 78%	41% 40% 40% 9 2-g 39% 39% 39% 33% 59% 59% 38% 538% 638% 638% 33% 538% 638% 638% 638% 638% 638% 638% 638% 638% 638%	40% 97% 63% ip sw_2-g 48% 49% 59% 54% 79% 36% 49% 90% 68% 87% 37% 44% 51% 73% 51%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz	$\begin{array}{c} 83\% \\ 100\% \\ 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 100\% \\ 92\% \\ 42\% \\ 98\% \\ 96\% \\ 96\% \\ 97\% \\ 100\% \\ 96\% \\ 62\% \\ 98\% \\ 56\% \\ 62\% \\ 98\% \\ 56\% \\ 99\% \\ 90\% \\ 90\% \\ 97\% \\ \end{array}$	$\begin{array}{c} 26\% \\ 38\% \\ 37\% \\ t w/s \\ 2-g \\ 42\% \\ 62\% \\ 42\% \\ 42\% \\ 45\% \\ 54\% \\ 39\% \\ 42\% \\ 45\% \\ 58\% \\ 42\% \\ 44\% \\ 56\% \\ 52\% \\ 40\% \\ 42\% \\ 40\% \\ 42\% \\ 40\% \\ 42\% \\ 40\% \\ 42\% \\ 40\% \\ 42\% \\ 40\% \\ 52\% \\ 52\% \\ 92\% \end{array}$	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	30% 100% 87% tw/s sw_2_3-; 90% 57% 92% 42% 76% 97% 98% 54% 88% 93%	63% 97% 97% 78% 78% 95% 39% 59% 55% 36% 95% 36% 42% 67% 70% 86% 64% 33% 55% 64% 70% 86% 64% 71% 78% 82%	41% 40% 40% 40% 2-g 39% 39% 39% 39% 39% 39% 39% 39% 39% 38% 559% 58% 63% 63% 33% 40% 35% 57%	$\begin{array}{c c} 40\% \\ \hline & 40\% \\ 97\% \\ \hline & 63\% \\ \hline & 63\% \\ \hline & 63\% \\ \hline & 97\% \\ 59\% \\ 59\% \\ 59\% \\ 59\% \\ 59\% \\ 59\% \\ 59\% \\ 68\% \\ 49\% \\ 90\% \\ 68\% \\ 87\% \\ 87\% \\ 37\% \\ 51\% \\ 73\% \\ \hline & 73\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram	$\begin{array}{c} 83\%\\ 100\%\\ 99\%\\ \hline \mathbf{t}\ \mathbf{w}/\ \mathbf{s}\\ \mathbf{sw}\\ 90\%\\ 49\%\\ 92\%\\ 42\%\\ 98\%\\ 96\%\\ 97\%\\ 100\%\\ 96\%\\ 45\%\\ 62\%\\ 62\%\\ 62\%\\ 98\%\\ 56\%\\ 49\%\\ 90\%\\ 90\%\\ 99\%\\ \end{array}$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 42% 42% 39% 54% 39% 58% 42% 44% 56% 25% 44% 42% 42% 42% 42% 42% 42% 42	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ \hline 87\% \\ \hline 87\% \\ \hline 97\% \\ \hline 99\% \\ \hline 92\% \\ \hline 97\% \\ \hline 94\% \\ \hline 98\% \\ \hline 98\% \\ \hline 99\% \\ \hline 99\% \\ \hline \end{array}$	63% 97% 78% 68% 39% 59% 54% 95% 36% 42% 67% 66% 42% 64% 43% 56% 71% 78% 82% 58%	41% 40% 40% 40% 40% 2-g 33% 33% 33% 33% 33% 33% 33% 53% 55% 66% 33% 55% 33% 55% 63% 33% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33%	$\begin{array}{c} 40\% \\ 97\% \\ 63\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 48\% \\ 49\% \\ 59\% \\ 54\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 90\% \\ 90\% \\ 90\% \\ 90\% \\ 44\% \\ 44\% \\ 44\% \\ 44\% \\ 51\% \\ 73\% \\ 51\% \\ 73\% \\ 62\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c} 83\%\\ 100\%\\ 99\%\\ \hline 83\%\\ 100\%\\ 99\%\\ \hline 8w\\ 90\%\\ 49\%\\ 92\%\\ 42\%\\ 98\%\\ 92\%\\ 42\%\\ 98\%\\ 96\%\\ 45\%\\ 62\%\\ 98\%\\ 56\%\\ 44\%\\ 90\%\\ 90\%\\ 95\%\\ 44\%\\ 94\%\\ 94\%\\ 94\%\\ 94\%\\ 94\%\\ 94\%\\ 94$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 42% 42% 42% 42%	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline $ 86\% \\ \hline $ 86\% \\ \hline $ 10\% \\ 90\% \\ \hline $ 64\% \\ 99\% \\ \hline $ 99\% \\ \hline $ 99\% \\ \hline $ 100\% \\ 92\% \\ \hline $ 42\% \\ -76\% \\ 99\% \\ \hline $ 99\% \\ \hline $ 100\% \\ 99\% \\ \hline $ 100\% \\ -76\% \\ -76\% \\ -76\% \\ -97\% \\ -97\% \\ -97\% \\ -97\% \\ -97\% \\ -97\% \\ -97\% \\ -99\% \\ \hline $ 10\% \\ -70\% \\ -99\% \\ \hline $ 48\% \\ -99\% \\ \hline $ 99\% \\ \hline $ 48\% \\ -99\% \\ \hline $ 99\% \\ \hline $ 10\% \\ -70\% \\ -70\% \\ -96\% \\ -4\% \\ -70\% \\ -99\% \\ \hline $ 10\% \\ -70\% \\ -70\% \\ -96\% \\ -4\% \\ -70\% \\ -99\% \\ \hline $ 10\% \\ -70\% \\ -90\% \\ -7$	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ \hline 87\% \\ \hline 87\% \\ \hline 87\% \\ \hline 97\% \\ \hline 90\% \\ \hline 92\% \\ \hline 92\% \\ \hline 92\% \\ \hline 42\% \\ \hline 97\% \\ \hline 97\% \\ \hline 97\% \\ \hline 77\% \\ \hline 75\% \\ \hline 57\% \\ \hline 45\% \\ \hline 57\% \\ \hline 98\% \\ \hline 98\% \\ \hline 98\% \\ \hline 99\% \\ \hline 64\% \\ \hline 99\% \\ \hline 48\% \\ \hline 99\% \\ \hline 88\% \\ \hline 99\% \\ \hline 8\% \\ \hline 8\% \\ \hline 99\% \\ \hline 8\% \hline 8\%$	63% 97% 78% ip g sw 68% 39% 54% 95% 54% 95% 64% 42% 67% 64% 43% 64% 43% 64% 43% 66% 71% 78% 86% 64% 43% 66% 71% 78% 58% 66% 78% 66% 66% 66% 66% 66% 66% 66% 78% 66% 78% 66% 78% 78% 78% 78% 78% 78% 78% 78% 78% 78	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 40\% \\ 97\% \\ 63\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 48\% \\ 49\% \\ 59\% \\ 55\% \\ 55\% \\ 66\% \\ 68\% \\ 68\% \\ 68\% \\ 68\% \\ 68\% \\ 68\% \\ 68\% \\ 61\% \\ 71\% \\ 51\% \\ 51\% \\ 51\% \\ 51\% \\ 73\% \\ 62\% \\ 62\% \\ 40\% \\ 74\% \\ 57\% \\ 37\% \\ 66\% \\ 66\% \\ 38\% \\ 38\% \\ 36\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c} 83\%\\ \hline 83\%\\ \hline 100\%\\ \hline 99\%\\ \hline 100\%\\ \hline 99\%\\ \hline 100\%\\ 92\%\\ 42\%\\ 98\%\\ 96\%\\ 92\%\\ 42\%\\ 98\%\\ 96\%\\ 96\%\\ 97\%\\ 100\%\\ 96\%\\ 45\%\\ 62\%\\ 98\%\\ 99\%\\ 56\%\\ 44\%\\ 99\%\\ 95\%\\ 44\%\\ 94\%\\ 94\%\\ 94\%\\ 99\%\\ 53\%\\ \hline 53\%\\ \hline \end{array}$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 42% 42% 42% 42%	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ \hline 86\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ \hline 87\% \\ \hline 87\% \\ \hline 97\% \\ \hline 99\% \\ \hline 92\% \\ 42\% \\ \hline 92\% \\ 42\% \\ \hline 97\% \\ 97\% \\ \hline 57\% \\ \hline 45\% \\ \hline 57\% \\ \hline 98\% \\ \hline 98\% \\ \hline 99\% \\ \hline 63\% \\ \hline 99\% \\ \hline 64\% \\ \hline 95\% \\ \hline 49\% \\ \hline 48\% \\ \hline 48\% \\ \hline 48\% \\ \hline 99\% \\ \hline 53\% \\ \hline 53\% \\ \hline \end{array}$	63% 97% 78% ip g sw 68% 39% 54% 95% 54% 95% 66% 67% 66% 67% 70% 86% 42% 67% 71% 82% 58% 42% 53% 37% 67% 81% 67% 81% 54%	41% 40% 40% 40% 9 2-g 33% 33% 33% 33% 33% 33% 33% 33% 33% 33% 33% 33% 33% 33% 33% 44% 33% 53% 63% 33% 44% 33% 44% 33% 44% 33% 44% 33% 44% 33% 44% 36% 44% 44% 44% 45%	$\begin{array}{c c} 40\% \\ \hline & 40\% \\ 97\% \\ \hline & 63\% \\ \hline & ip \\ sw_2-g \\ 48\% \\ 49\% \\ 59\% \\ 54\% \\ 79\% \\ 36\% \\ 36\% \\ 36\% \\ 37\% \\ 44\% \\ 51\% \\ 51\% \\ 73\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ 37\% \\ 66\% \\ 37\% \\ 51\% \\ 57\% \\ 57\% \\ 37\% \\ 66\% \\ 38\% \\ 36\% \\ 54\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} 83\% \\ \hline 83\% \\ \hline 100\% \\ 99\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 42% 42% 42% 44% 39% 58% 42% 44% 56% 25% 92% 92% 92% 92% 92% 92% 92% 52% 70% 39%	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline 86\% \\ \hline 100\% \\ \hline 86\% \\ \hline 100\% \\ \hline 92\% \\ \hline 42\% \\ \hline 992\% \\ \hline 42\% \\ \hline 75\% \\ \hline 97\% \\ \hline 45\% \\ \hline 46\% \\ \hline 88\% \\ \hline 98\% \\ \hline 54\% \\ \hline 98\% \\ \hline 98\% \\ \hline 99\% \\ \hline 63\% \\ \hline 99\% \\ \hline 63\% \\ \hline 99\% \\ \hline 63\% \\ \hline 99\% \\ \hline 66\% \\ \hline 88\% \\ \hline 99\% \\ \hline 53\% \\ \hline 66\% \\ \hline 66\% \\ \hline \end{array}$	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ \hline 87\% \\ \hline 87\% \\ \hline 87\% \\ \hline 97\% \\ \hline 99\% \\ \hline 92\% \\ \hline 93\% \\ \hline 97\% \\ \hline 64\% \\ \hline 99\% \\ \hline 64\% \\ \hline 95\% \\ \hline 99\% \\ \hline 64\% \\ \hline 95\% \\ \hline 99\% \\ \hline 66\% \\ \hline 66\% \\ \hline \end{array}$	63% 97% 78% 68% 39% 59% 54% 95% 36% 42% 67% 66% 70% 86% 64% 64% 64% 70% 88% 70% 88% 70% 88% 70% 70% 88% 70% 70% 88% 70% 82% 70% 82% 76% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 76% 56% 76% 76% 76% 76% 76% 76% 76% 76% 76% 7	41% 40% 40% 40% 40% 2-g 33% 34% 55% 55% 55% 55% 55% 63% 52% 63% 52% 63% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33% 55% 33% 54% 36% 51% 44% 44% 44% 44%	$\begin{array}{c} 40\% \\ 97\% \\ 63\% \\ \hline \\ 63\% \\ \hline \\ 97\% \\ 2-g \\ 48\% \\ 49\% \\ 59\% \\ 59\% \\ 54\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 70\% \\ 66\% \\ 68\% \\ 40\% \\ 74\% \\ 71\% \\ 73\% \\ 62\% \\ 40\% \\ 74\% \\ 74\% \\ 37\% \\ 37\% \\ 36\% \\ 36\% \\ 54\% \\ 63\% \\ \end{array}$	$\begin{array}{c c c} 97\% \\\hline & 97\% \\\hline & 63\% \\\hline & ip \\\hline & sw_2 3- \\\hline & 48\% \\\hline & 49\% \\\hline & 60\% \\\hline & 55\% \\\hline & 78\% \\\hline & 55\% \\\hline & 78\% \\\hline & 64\% \\\hline & 61\% \\\hline & 61\% \\\hline & 68\% \\\hline & 68\% \\\hline & 57\% \\\hline & 68\% \\\hline & 69\% \\\hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c} 83\%\\ 100\%\\ 99\%\\ \hline 83\%\\ 100\%\\ 99\%\\ \hline 8w\\ 90\%\\ 49\%\\ 90\%\\ 49\%\\ 92\%\\ 42\%\\ 98\%\\ 96\%\\ 96\%\\ 96\%\\ 62\%\\ 62\%\\ 98\%\\ 96\%\\ 96\%\\ 96\%\\ 97\%\\ 99\%\\ 67\%\\ 98\%\\ 99\%\\ 67\%\\ 98\%\\ 95\%\\ 44\%\\ 94\%\\ 94\%\\ 94\%\\ 94\%\\ 94\%\\ 92\%\\ 53\%\\ 92\%\\ 42\%\\ 92\%\\ 42\%\\ 80\%\\ 92\%\\ 53\%\\ 92\%\\ 42\%\\ 80\%\\ 92\%\\ 53\%\\ 92\%\\ 92\%\\ 53\%\\ 92\%\\ 92\%\\ 92\%\\ 92\%\\ 92\%\\ 92\%\\ 92\%\\ 92$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 42% 42% 42% 54% 54% 54% 54% 54% 54% 54% 54	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline $ 86\% \\ \hline $ 80\% \\ \hline $ 10\% \\ 90\% \\ \hline $ 64\% \\ 92\% \\ \hline $ 64\% \\ 92\% \\ \hline $ 76\% \\ 76\% \\ \hline $ 97\% \\ \hline $ 97\% \\ \hline $ 100\% \\ 97\% \\ \hline $ 100\% \\ 75\% \\ \hline $ 76\% \\ \hline $ 75\% \\ \hline $ 37\% \\ \hline $ 97\% \\ \hline $ 100\% \\ \hline $ 97\% \\ \hline $ 100\% \\ \hline $ 97\% \\ \hline $ 38\% \\ \hline $ 98\% \\ \hline $ 54\% \\ \hline $ 70\% \\ \hline $ 99\% \\ \hline $ 53\% \\ \hline $ 66\% \\ \hline $ 76\% \hline \hline $ 76\% \\ \hline $ 76\% \hline \hline \hline $ 76\% \hline \hline \hline $ 76\% \hline \hline \hline \hline \hline $ 76\% $	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ \hline 87\% \\ \hline 87\% \\ \hline 87\% \\ \hline 97\% \\ \hline 99\% \\ \hline 92\% \\ \hline 92\% \\ \hline 42\% \\ \hline 97\% \\ \hline 97\% \\ \hline 97\% \\ \hline 97\% \\ \hline 77\% \\ \hline 45\% \\ \hline 55\% \\ \hline 45\% \\ \hline 54\% \\ \hline 98\% \\ \hline 98\% \\ \hline 98\% \\ \hline 99\% \\ \hline 66\% \\ \hline 99\% \\ \hline 48\% \\ \hline 99\% \\ \hline 66\% \\ \hline 76\% \\ \hline 76\% \\ \hline \end{array}$	63% 97% 78% 78% 97% 78% 97% 78% 97% 97% 78% 99% 54% 95% 36% 42% 67% 42% 64% 43% 56% 56% 42% 67% 53% 76% 53% 36% 54% 54% 54% 63%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 40\% \\ 97\% \\ 63\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 48\% \\ 49\% \\ 59\% \\ 55\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 36\% \\ 44\% \\ 44\% \\ 44\% \\ 51\% \\ 73\% \\ 51\% \\ 73\% \\ 51\% \\ 73\% \\ 51\% \\ 73\% \\ 62\% \\ 40\% \\ 74\% \\ 74\% \\ 74\% \\ 74\% \\ 57\% \\ 33\% \\ 36\% \\ 38\% \\ 36\% \\ 54\% \\ 81\% \end{array}$	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 63\% \\ \hline & ip \\ 8w_2 2 3- \\ 48\% \\ \hline & 49\% \\ \hline & 49\% \\ \hline & 60\% \\ \hline & 55\% \\ \hline & 78\% \\ \hline & 60\% \\ \hline & 55\% \\ \hline & 78\% \\ \hline & 89\% \\ \hline & 68\% \\ \hline & 64\% \\ \hline & 55\% \\ \hline & 64\% \\ \hline & 64\% \\ \hline & 56\% \\ \hline & 64\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 62\% \\ \hline & 68\% \\ \hline & 86\% \\ \hline & 86\% \\ \hline & 86\% \\ \hline & 80\% \\ \hline & 36\% \\ \hline & 47\% \\ \hline & 69\% \\ \hline & 43\% \\ \hline \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} 83\% \\ \hline 83\% \\ \hline 100\% \\ 99\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	26% 38% 37% t w/s 2-g 42% 42% 42% 42% 42% 42% 42% 44% 39% 58% 42% 44% 56% 25% 92% 92% 92% 92% 92% 92% 92% 92	$\begin{array}{c c} 31\% \\ \hline 31\% \\ \hline 100\% \\ 86\% \\ \hline 86\% \\ \hline 100\% \\ \hline 86\% \\ \hline 100\% \\ \hline 92\% \\ \hline 42\% \\ \hline 992\% \\ \hline 42\% \\ \hline 75\% \\ \hline 97\% \\ \hline 45\% \\ \hline 46\% \\ \hline 88\% \\ \hline 98\% \\ \hline 54\% \\ \hline 98\% \\ \hline 98\% \\ \hline 99\% \\ \hline 63\% \\ \hline 99\% \\ \hline 63\% \\ \hline 99\% \\ \hline 63\% \\ \hline 99\% \\ \hline 66\% \\ \hline 88\% \\ \hline 99\% \\ \hline 53\% \\ \hline 66\% \\ \hline 66\% \\ \hline \end{array}$	$\begin{array}{c c} 30\% \\ \hline 30\% \\ \hline 100\% \\ \hline 87\% \\ \hline 87\% \\ \hline 87\% \\ \hline 97\% \\ \hline 99\% \\ \hline 92\% \\ \hline 93\% \\ \hline 97\% \\ \hline 64\% \\ \hline 99\% \\ \hline 64\% \\ \hline 95\% \\ \hline 99\% \\ \hline 64\% \\ \hline 95\% \\ \hline 99\% \\ \hline 66\% \\ \hline 66\% \\ \hline \end{array}$	63% 97% 78% 68% 39% 59% 54% 95% 36% 42% 67% 66% 70% 86% 64% 64% 64% 70% 88% 70% 88% 70% 88% 70% 70% 88% 70% 70% 88% 70% 82% 70% 82% 76% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 82% 76% 55% 76% 56% 76% 76% 76% 76% 76% 76% 76% 76% 76% 7	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 40\% \\ 97\% \\ 63\% \\ \hline \\ 63\% \\ \hline \\ 97\% \\ 2-g \\ 48\% \\ 49\% \\ 59\% \\ 59\% \\ 54\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 79\% \\ 70\% \\ 66\% \\ 68\% \\ 40\% \\ 74\% \\ 71\% \\ 73\% \\ 62\% \\ 40\% \\ 74\% \\ 74\% \\ 37\% \\ 37\% \\ 36\% \\ 36\% \\ 54\% \\ 63\% \\ \end{array}$	$\begin{array}{c c c} 97\% \\\hline & 97\% \\\hline & 63\% \\\hline & ip \\ & sw_2 3- \\\hline & 48\% \\\hline & 49\% \\\hline & 60\% \\\hline & 55\% \\\hline & 78\% \\\hline & 55\% \\\hline & 78\% \\\hline & 64\% \\\hline & 64\% \\\hline & 55\% \\\hline & 64\% \\\hline & 64\% \\\hline & 64\% \\\hline & 62\% \\\hline & 68\% \\\hline & 86\% \\\hline & 68\% \\\hline & 66\% \\\hline & 69\% \\\hline \end{array}$

	t	t	t	t	s	s	s	s
Dataset (Query)	sw		sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	
Amazon	50%	52%	52%	52%	59%	54%	59%	59%
Adnan Ibrahim	58%	64%	62%	78%	52%	54%	77%	67%
Amman	85%	50%	64%	64%	52%	54%	50%	50%
Jarrar	53%	52%	53%	53%	55%	52%	53%	53%
Alishaa'	65%	52%	69%	69%	51%	53%	64%	69%
Nahawnd	54%	56%	55%	51%	95%	56%	93%	93%
Qersh	50%	50%	50%	50%	95%	55%	88%	88%
Asia	50%	50%	69%	60%	96%	65%	93%	93%
Shir (Shi3r)	71%	53%	67%	67%	54%	53%	54%	54%
Arafat	55%	55%	55%	55%	62%	57%	58%	58%
Cameron	52%	50%	52%	52%	64%	60%	65%	62%
Maliki	62%	35%	38%	40%	50%	38%	55%	55%
Baqara	54%	57%	60%	60%	51%	52%	73%	73%
Sakhr	57%	41%	53%	53%	60%	59%	59%	59%
Iqteran	59%	52%	56%	56%	87%	54%	87%	86%
Aziz	87%	77%	89%	89%	92%	90%	91%	91%
Aziz	58%	52%	58%	58%	92% 63%	58%	63%	63%
Jalamah	56%	52%	58% 60%	58% 60%	63% 62%	$\frac{58\%}{54\%}$	66%	66%
Malek Abdullah	90%	82%	61%	65%	98%	100%	98%	98%
Jamaa Arabiya	53%	52%	94%	94%	87%	81%	92%	89%
Sakakini	61%	55%	50%	50%	87%	58%	88%	88%
Bursa	83%	52%	77%	73%	97%	55%	100%	100%
Ain	52%	52%	69%	69%	60%	51%	53%	53%
Thaheryah	59%	53%	54%	54%	84%	53%	56%	60%
Tarablus	65%	52%	57%	55%	88%	56%	99%	98%
Azhar	53%	56%	57%	57%	53%	55%	53%	53%
Arabiyah	67%	52%	74%	74%	91%	52%	69%	69%
mabiyan								
Asad	83%	37%	40%	42%	64%	47%	50%	65%
		37% 52%	40% 100%	42% 100%	64% 97%	47% 53%	50% 97%	65% 97%
Asad Athraa'	83%						97%	97%
Asad	83% 100% 99%	52% 51%	100% 86%	100% 87%	97% 79%	53% 53%	97% 67%	97% 67%
Asad Athraa' Qedra	83% 100% 99% t w/ s	52% 51% t w/ s	100% 86% tw/s	100% 87% t w/ s	97% 79% ip	53% 53% ip	97% 67% ip	97% 67% ip
Asad Athraa'	83% 100% 99%	52% 51%	100% 86%	100% 87% t w/ s	97% 79% ip	53% 53% ip 2-g	97% 67%	97% 67% ip
Asad Athraa' Qedra Dataset (Query) Amazon	83% 100% 99% t w/ s sw 90%	52% 51% t w/ s 2-g 54%	100% 86% t w/ s sw_2-g 90%	100% 87% t w/ s sw_2_3- 90%	97% 79% ip g sw 69%	53% 53% ip 2-g 51%	97% 67% ip sw_2-g 57%	97% 67% ip sw_2_3- 57%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	83% 100% 99% t w/ s sw 90% 58%	52% 51% t w/ s 2-g 54% 66%	100% 86% t w/s sw_2-g 90% 68%	100% 87% t w/ s sw_2_3-g 90% 62%	97% 79% ip g sw 69% 50%	53% 53% ip 2-g 51% 52%	97% 67% ip sw_2-g 57% 53%	97% 67% ip sw_2_3 57% 54%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	83% 100% 99% t w/ s sw 90% 58% 92%	52% 51% t w/ s 2-g 54% 66% 54%	100% 86% t w/ s sw_2-g 90% 68% 92%	100% 87% t w/ s sw_2_3-s 90% 62% 92%	97% 79% ip g sw 69% 50% 62%	53% 53% ip 2-g 51% 52% 55%	97% 67% ip sw_2-g 57% 53% 62%	97% 67% ip sw_2_3 - 57% 54% 62%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	83% 100% 99% t w/ s sw 90% 58% 92% 53%	52% 51% t w/s 2-g 54% 66% 54% 53%	100% 86% tw/s sw_2-g 90% 68% 92% 53%	$ \begin{array}{c c} 100\% \\ 87\% \\ \hline $ sw_2_3-; \\ 90\% \\ 62\% \\ 92\% \\ 92\% \\ 53\% \\ \end{array} $	97% 79% ip g sw 69% 50% 62% 58%	53% 53% ip 2-g 51% 52% 55% 53%	97% 67% ip 57% 53% 62% 58%	97% 67% ip sw_2_3 57% 54% 62% 59%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	83% 100% 99% t w/ s sw 90% 58% 92% 53% 98%	52% 51% t w/ s 2-g 54% 66% 54% 53%	100% 86% tw/s sw_2-g 90% 68% 92% 53% 77%	100% 87% tw/s sw_2_3-g 90% 62% 92% 53% 77%	97% 79% ip g sw 69% 50% 62% 58% 95%	53% 53% ip 2-g 551% 555% 53% 55% 53%	97% 67% ip sw_2-g 57% 53% 62% 58% 80%	97% 67% ip sw_2_3 57% 54% 62% 59% 79%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	83% 100% 99% t w/ s sw 90% 58% 92% 53% 98% 98%	52% 51% t w/s 2-g 54% 66% 54% 53% 55% 61%	100% 86% t w/s sw_2-g 90% 68% 92% 53% 77% 97%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% ip g sw 69% 50% 62% 58% 95% 51%	53% 53% ip 2-g 51% 52% 55% 53% 53% 65% 53% 64% 64%	97% 67% ip sw_2-g 57% 62% 58% 80% 51%	97% 67% ip sw_2_3 57% 54% 62% 59% 79% 51%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	83% 100% 99% t w/ s sw 90% 58% 92% 53% 98% 96% 97%	52% 51% t w/s 2-g 54% 66% 54% 53% 55% 61% 52%	$\begin{array}{c c} 100\% \\ \hline 86\% \\ \hline $t w/s \\ sw_2-g \\ 90\% \\ \hline 68\% \\ 92\% \\ 53\% \\ 77\% \\ 97\% \\ \hline 97\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% ip 50% 69% 50% 62% 58% 95% 51% 52%	53% 53% ip 2-g 51% 52% 55% 53% 53% 65% 53% 64% 64% 51%	97% 67% ip sw_2-g 53% 62% 58% 80% 51% 58%	$\begin{array}{c c} 97\% \\ \hline 67\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2_3} \\ 57\% \\ 54\% \\ 62\% \\ 59\% \\ 79\% \\ 51\% \\ 59\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	83% 100% 99% t w/ s sw 90% 58% 92% 53% 98% 96% 96% 97% 100%	52% 51% t w/ s 2-g 54% 66% 54% 53% 61% 52% 63%	$\begin{array}{c c} 100\% \\ \hline 86\% \\ \hline $\mathbf{t} \ w/ \ s} \\ \hline $\mathbf{sw_2-g} \\ 90\% \\ \hline 90\% \\ \hline 92\% \\ \hline 53\% \\ \hline 77\% \\ 97\% \\ 97\% \\ \hline 97\% \\ 100\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% ip s sw 69% 50% 62% 58% 95% 51% 52% 70%	53% 53% ip 2-g 51% 55% 55% 53% 6 64% 6 51% 6 6 53% 6 64% 6 51% 6 51% 6 75%	97% 67% ip sw_2-g 53% 62% 53% 62% 58% 80% 51% 58% 90%	97% 67% ip sw_2_3 . 57% 62% 62% 59% 79% 51% 59% 89%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	83% 100% 99% t w/ s sw 90% 58% 92% 53% 92% 53% 98% 96% 96% 96%	$\begin{array}{c c} 52\% \\ \hline 51\% \\ \hline t w/s \\ \hline 2-g \\ 54\% \\ \hline 66\% \\ 54\% \\ \hline 53\% \\ \hline 55\% \\ \hline 61\% \\ \hline 61\% \\ \hline 63\% \\ \hline 54\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	100% 87% tw/s sw_2_3-; 90% 62% 53% 77% 97% 97% 76%	97% 79% ip g sw 69% 50% 62% 58% 95% 51% 51% 52% 70% 72%	53% 53% ip 2-g 51% 52% 55% 53% 6 51% 6 51% 6 51% 6 51% 6 52% 52%	$\begin{array}{c c} 97\% \\ \hline 67\% \\ \hline \mathbf{ip} \\ \mathbf{sw_2-g} \\ 57\% \\ 53\% \\ 62\% \\ 62\% \\ 58\% \\ 80\% \\ 51\% \\ 58\% \\ 90\% \\ 71\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	83% 100% 99% t w/ s sw 90% 58% 92% 53% 92% 53% 92% 53% 92% 53% 92% 53% 92% 53% 96% 96% 96% 56%	$\begin{array}{c c} 52\% \\ \hline 51\% \\ \hline t w/s \\ \hline 2-g \\ 54\% \\ \hline 66\% \\ 54\% \\ \hline 55\% \\ \hline 61\% \\ \hline 63\% \\ \hline 52\% \\ \hline 54\% \\ \hline 55\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% ip g sw 69% 50% 51% 51% 51% 52% 70% 86%	53% 53% ip 2-g 5<	97% 67% ip sw_2-g 57% 53% 62% 80% 51% 58% 90% 71% 87%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	83% 100% 99% t w/ s sw 90% 58% 92% 53% 98% 96% 96% 96% 96% 56% 65%	$\begin{array}{c c} 52\% \\ \hline 51\% \\ \hline t w/s \\ 2-g \\ 54\% \\ 66\% \\ 54\% \\ 55\% \\ 61\% \\ 52\% \\ 63\% \\ 55\% \\ 63\% \\ 55\% \\ 62\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% ip 3 sw 69% 50% 62% 58% 95% 51% 52% 70% 72% 86% 68%	$\begin{array}{c c} 53\% \\ \hline 53\% \\ \hline 2 - g \\ 51\% \\ \hline 51\% \\ \hline 51\% \\ \hline 52\% \\ \hline 55\% \\ \hline 55\% \\ \hline 55\% \\ \hline 6 53\% \\ \hline 6 64\% \\ \hline 6 64\% \\ \hline 6 64\% \\ \hline 51\% \\ \hline 6 52\% \\ \hline 6 60\% \\ \hline 6 67\% \end{array}$	$\begin{array}{c c} 97\% \\\hline 67\% \\\hline \mathbf{ip} \\\mathbf{sw}_2-\mathbf{g} \\57\% \\\hline 53\% \\\hline 62\% \\58\% \\\hline 80\% \\\hline 51\% \\51\% \\\hline 58\% \\\hline 90\% \\\hline 71\% \\\hline 71\% \\\hline 87\% \\\hline 50\% \\\hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	83% 100% 99% tw/s sw 90% 58% 92% 53% 98% 96% 97% 96% 96% 96% 56% 65% 98% 58%	$\begin{array}{c c} 52\%\\ \hline 51\%\\ \hline t w/s\\ 2-g\\ 54\%\\ \hline 66\%\\ 54\%\\ \hline 55\%\\ \hline 61\%\\ 55\%\\ \hline 61\%\\ 55\%\\ \hline 61\%\\ 55\%\\ \hline 61\%\\ 55\%\\ \hline 63\%\\ \hline 54\%\\ \hline 55\%\\ \hline 62\%\\ \hline 38\%\\ \hline 38\%\\ \hline 53\%\\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% ip g sw 69% 50% 62% 52% 70% 72% 86% 68% 52% 52% 52% 52% 52% 52% 52% 52	$\begin{array}{c c} 53\%\\ \hline 53\%\\ \hline 53\%\\ \hline 9\\ 2\text{-g}\\ 51\%\\ 51\%\\ 55\%\\ 55\%\\ 55\%\\ 55\%\\ 5664\%\\ 5664\%\\ 5664\%\\ 566\%\\ 52\%\\ 667\%\\ 52\%\\ 6667\%\\ 566\%\\ 53\%\\ 653\%\\ \hline 83\%\\ 53\%\\ \hline 83\%$	$\begin{array}{c c} 97\% \\ \hline & 67\% \\ \hline & \mathbf{ip} \\ \mathbf{sw}_2-\mathbf{g} \\ 57\% \\ \hline & 53\% \\ 62\% \\ 62\% \\ 62\% \\ 62\% \\ \mathbf{sw} \\ 58\% \\ \mathbf{sw} \\ 58\% \\ \mathbf{sw} \\ 51\% \\ \mathbf{sw} \\ 58\% \\ \mathbf{sw} \\ 50\% \\ \mathbf{sw} \\ 50\% \\ \mathbf{sw} \\ 53\% \\ \mathbf{sw} \\ $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini	$\begin{array}{c c} 83\% \\ \hline 83\% \\ \hline 100\% \\ 99\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 60% 60% 62% 58% 95% 51% 52% 70% 86% 86% 52% 52% 70% 62% 52%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & sw_2-g \\ 57\% \\ \hline & 53\% \\ 62\% \\ 62\% \\ 58\% \\ 80\% \\ \hline & 51\% \\ 58\% \\ 58\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 58\% \\ \hline & 50\% \\ \hline & 53\% \\ \hline & 50\% \\ \hline & 53\% \\ \hline & 59\% \\ \hline & 75\% \\ \hline & 75\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakaini Bursa	$\begin{array}{c c} 83\% \\ \hline 83\% \\ \hline 100\% \\ 99\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 79% 69% 60% 62% 51% 52% 70% 70% 70% 70% 70% 70% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 54% 54% 56% 50%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & sw_2-g \\ 57\% \\ \hline & 53\% \\ 62\% \\ 58\% \\ 80\% \\ 51\% \\ 51\% \\ 71\% \\ 87\% \\ 50\% \\ \hline & 53\% \\ 73\% \\ 59\% \\ 73\% \\ 75\% \\ 75\% \\ 75\% \\ 50\% \\ \hline & 50\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c c} 83\% \\ 83\% \\ 100\% \\ 99\% \\ \hline 8w \\ 90\% \\ 58\% \\ 92\% \\ 53\% \\ 98\% \\ 96\% \\ 97\% \\ 96\% \\ 96\% \\ 96\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 66\% \\ 65\% \\ 65\% \\ 98\% \\ 97\% \\ 98\% \\ 99\% \\ 99\% \\ 70\% \\ 99\% \\ 99\% \\ 95\% \\ 55\% \\ 94\% \\ 94\% \\ 94\% \\ 94\% \\ 94\% \\ 83\% \\ 94\% \\ 83\% \\ 94\% \\ 83\% \\ 94\% \\ 83\% \\ 84\% \\ 83\% \\ 84\% \\ 83\% \\ 84\% \\ 8$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 79% 60% 60% 60% 62% 50% 51% 52% 70% 70% 70% 86% 68% 71% 79% 52% 51% 52% 71% 79% 52% 51% 52% 51% 52% 51% 52% 51% 52%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & \mathbf{ip} \\ 8\mathbf{w} _ 2\mathbf{.g} \\ 53\% \\ \hline & 53\% \\ \hline & 58\% \\ 80\% \\ \hline & 51\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 53\% \\ \hline & 53\% \\ \hline & 55\% \\ \hline & 75\% \\ \hline & 55\% \\ \hline & 50\% \\ \hline & 52\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c c} 83\% \\ \hline 83\% \\ \hline 100\% \\ 99\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 97% 79% 97% 69% 60% 51% 51% 52% 70% 70% 70% 70% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 50% 50% 50% 50% 51%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & sw_2-g \\ 57\% \\ \hline & 53\% \\ 62\% \\ 58\% \\ 80\% \\ 51\% \\ 51\% \\ 71\% \\ 87\% \\ 50\% \\ 55\% \\ 50\% \\ 55\% \\ 73\% \\ 75\% \\ 75\% \\ 75\% \\ 59\% \\ 50\% \\ 69\% \\ 69\% \\ 52\% \\ 51\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 97% 97% 97% 97% 95% 95% 95% 95% 95% 70% 70% 72% 88% 62% 52% 58% 71% 75% 55% 75% 77% 56% 50% 70% 50% 50% 55% 55% 55% 55% 55% 55% 55% 5	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & sw_2-g \\ 57\% \\ \hline & 53\% \\ 62\% \\ 62\% \\ 58\% \\ 80\% \\ \hline & 58\% \\ 90\% \\ \hline & 51\% \\ 55\% \\ \hline & 50\% \\ 55\% \\ \hline & 53\% \\ \hline & 53\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 55\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} 83\% \\ 83\% \\ 100\% \\ 99\% \\ \hline 8w \\ 90\% \\ 58\% \\ 92\% \\ 53\% \\ 98\% \\ 96\% \\ 97\% \\ 96\% \\ 96\% \\ 96\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 61\% \\ 99\% \\ 58\% \\ 61\% \\ 99\% \\ 55\% \\ 55\% \\ 94\% \\ 99\% \\ 55\% \\ 55\% \\ 94\% \\ 99\% \\ 54\% \\ 99\% \\ 54\% \\ 92\% \\ 54\% \\ 92\% \\ \end{array}$	52% 51% t w/s 2-g 54% 66% 54% 55% 61% 55% 61% 55% 63% 54% 55% 62% 38% 53% 60% 92% 58% 57% 87% 87% 87% 87% 51% 100% 91% 51% 51% 51% 51% 51% 51% 51% 5	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 97% 97% 95% 95% 95% 95% 95% 95% 95% 95% 95% 95	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & sw_2-g \\ 57\% \\ \hline & 53\% \\ 62\% \\ 62\% \\ 58\% \\ 80\% \\ \hline & 51\% \\ 58\% \\ 58\% \\ \hline & 58\% \\ 50\% \\ \hline & 51\% \\ 71\% \\ 87\% \\ \hline & 50\% \\ 53\% \\ \hline & 50\% \\ \hline & 53\% \\ \hline & 53\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 57\% \\ \hline & 57\% \\ \hline & 57\% \\ \hline & 67\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c c} 83\% \\ \hline 83\% \\ \hline 100\% \\ 99\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 97% 79% 97% 60% 60% 50% 51% 51% 52% 70% 86% 86% 88% 62% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 52% 50% 50% 51% 51% 51% 51% 63% 64% 64%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & sw_2-g \\ 57\% \\ \hline & 53\% \\ \hline & 62\% \\ 58\% \\ \hline & 80\% \\ \hline & 51\% \\ \hline & 50\% \\ \hline & 55\% \\ \hline & 75\% \\ \hline & 59\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 52\% \\ \hline & 51\% \\ \hline & 57\% \\ \hline & 57\% \\ \hline & 57\% \\ \hline & 67\% \\ \hline & 82\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c} 83\% \\ 83\% \\ 100\% \\ 99\% \\ \hline 8w \\ 90\% \\ 58\% \\ 92\% \\ 53\% \\ 98\% \\ 96\% \\ 97\% \\ 96\% \\ 96\% \\ 96\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 65\% \\ 61\% \\ 99\% \\ 58\% \\ 61\% \\ 99\% \\ 55\% \\ 55\% \\ 94\% \\ 99\% \\ 55\% \\ 55\% \\ 94\% \\ 99\% \\ 54\% \\ 99\% \\ 54\% \\ 92\% \\ 54\% \\ 92\% \\ \end{array}$	52% 51% t w/s 2-g 54% 66% 54% 55% 61% 55% 61% 55% 63% 54% 55% 62% 38% 53% 60% 92% 58% 57% 87% 87% 87% 87% 51% 100% 91% 51% 51% 51% 51% 51% 51% 51% 5	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 79% 79% 97% 97% 95% 95% 95% 95% 95% 95% 95% 95% 95% 95	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 97\% \\ \hline & 97\% \\ \hline & 67\% \\ \hline & sw_2-g \\ 57\% \\ \hline & 53\% \\ 62\% \\ 62\% \\ 58\% \\ 80\% \\ \hline & 51\% \\ 58\% \\ 58\% \\ \hline & 58\% \\ 50\% \\ \hline & 51\% \\ 71\% \\ 87\% \\ \hline & 50\% \\ 53\% \\ \hline & 50\% \\ \hline & 53\% \\ \hline & 53\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 55\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 50\% \\ \hline & 57\% \\ \hline & 57\% \\ \hline & 57\% \\ \hline & 67\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Table C.19: Per level and query weighted recall when using BRF benchmarks for Bing.

Table C.20: Per level and query weighted precision when using BRF benchmarks for Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	50%	76%	57%	57%	77%	76%	77%	77%
Adnan Ibrahim	77%	79%	78%	85%	63%	76%	82%	80%
Amman	88%	50%	76%	76%	59%	76%	50%	50%
Jarrar	77%	76%	77%	77%	77%	27%	77%	77%
Alishaa'	79%	76%	81%	81%	59%	76%	76%	81%
Nahawnd	56%	77%	55%	54%	95%	77%	94%	94%
Qersh	50%	50%	50%	50%	95%	76%	89%	89%
Asia	50%	50%	81%	78%	96%	79%	94%	94%
Shir (Shi3r)	82%	76%	80%	80%	76%	76%	76%	76%
Arafat	69%	76%	76%	76%	75%	77%	77%	77%
Cameron	63%	50%	63%	63%	69%	71%	73%	72%
Maliki	82%	53%	49%	53%	51%	56%	40%	40%
Bagara	76%	77%	69%	69%	51%	63%	82%	82%
Sakhr	63%	60%	62%	62%	42%	44%	41%	41%
Iqteran	77%	76%	77%	77%	90%	76%	90%	89%
Aziz	90%	84%	91%	91%	93%	92%	92%	92%
Ahram	77%	76%	77%	77%	79%	77%	79%	79%
Jalamah	64%	76%	69%	69%	69%	76%	80%	80%
Malek Abdullah	92%	87%	69% 61%	69%	<u>69%</u> 98%	100%	80% 98%	98%
Jamaa Arabiya	76%	76%	95%	95%	98%	86%	98%	98%
Sakakini	78%	76%	50%	50%	90%	77%	90%	90%
Bursa	87%	76%	84%	82%	97%	76%	100%	100%
Ain	59%	76%	69%	81%	74%	75%	76%	76%
Thaheryah	77%	76%	76%	76%	87%	76%	70%	78%
Tarablus	65%	76%	77%	76%	90%	77%	99%	98%
Azhar	54%	70%	71%	71%	55%	76%	55%	55%
		76%	79%	79%	91%	59%	81%	81%
Arabiyah	80%							
Asad	86%	53%	52%	36%	83%	77%	44%	82%
	86% 100%	53% 76%	100%	100%	97%	76%	97%	97%
Asad	86%	53%						
Asad Athraa'	86% 100%	53% 76%	100%	100%	97%	76%	97%	97%
Asad Athraa'	86% 100% 99%	53% 76% 59%	100% 89%	100% 90% tw/s	97% 85% ip	76% 76% ip	97% 80%	97% 80%
Asad Athraa' Qedra	86% 100% 99% t w/ s	53% 76% 59% tw/s	100% 89% tw/s	100% 90% tw/s	97% 85% ip	76% 76% ip 2-g	97% 80% ip	97% 80% ip
Asad Athraa' Qedra Dataset (Query)	86% 100% 99% t w/ s sw	53% 76% 59% t w/ s 2-g	100% 89% t w/ s sw_2-g	100% 90% t w/s sw_2_3-g	97% 85% ip 5 sw	76% 76% ip 2-g 55%	97% 80% ip sw_2-g	97% 80% ip sw_2_3-g
Asad Athraa' Qedra Dataset (Query) Amazon	86% 100% 99% t w/ s sw 91%	53% 76% 59% t w/ s 2-g 76%	100% 89% t w/ s sw_2-g 91%	100% 90% t w/s sw_2_3-g 91%	97% 85% ip 5 sw 72%	76% 76% ip 2-g 55% 63%	97% 80% ip sw_2-g 71%	97% 80% ip sw_2_3-g 71%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	86% 100% 99% t w/ s sw 91% 77%	53% 76% 59% t w/ s 2-g 76% 80%	100% 89% t w/s sw_2-g 91% 80%	100% 90% t w/ s sw_2_3-g 91% 72%	97% 85% ip 5 sw 72% 50%	76% 76% ip 2-g 55% 63% 76%	97% 80% ip sw_2-g 71% 55%	97% 80% ip sw_2_3-g 71% 56%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	86% 100% 99% t w/ s sw 91% 77% 93%	53% 76% 59% t w/ s 2-g 76% 80% 76%	100% 89% t w/ s sw_2-g 91% 80% 93%	100% 90% t w/ s sw_2_3-g 91% 72% 93%	97% 85% ip 5 sw 72% 50% 66% 67%	76% 76% ip 2-g 55% 63% 76% 2.3%	97% 80% ip sw_2-g 71% 55% 66%	97% 80% ip sw_2_3-g 71% 56% 66%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	86% 100% 99% t w/ s sw 91% 77% 93% 77% 98%	53% 76% 59% t w/ s 2-g 76% 80% 76% 69%	100% 89% t w/s sw_2-g 91% 80% 93% 77% 83%	100% 90% tw/s sw_2_3-g 91% 72% 93% 77% 83%	97% 85% ip 5 sw 72% 50% 66% 67% 95%	76% ip 2-g 555% 63% 76% 2-g 557% 63% 76%	97% 80% ip sw_2-g 71% 55% 66% 67% 83%	97% 80% ip sw_2_3-g 71% 56% 66% 69% 83%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	86% 100% 99% t w/ s sw 91% 77% 93% 77% 98% 98%	53% 76% 59% tw/s 2-g 76% 80% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76%	100% 89% t w/s sw_2-g 91% 80% 93% 77% 83% 97%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 85% ip 5 sw 72% 50% 66% 67% 95% 75%	76% ip 2-g 555% 63% 76% 28% 79% 76%	97% 80% ip sw_2-g 71% 55% 66% 67% 83% 75%	97% 80% ip sw_2_3-g 71% 56% 66% 69% 83% 75%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	86% 100% 99% t w/ s sw 91% 77% 93% 77% 98% 96% 97% 97%	53% 76% 59% t w/ s 2-g 76% 80% 76% 77% 69% 78% 63%	$\begin{array}{c c} 100\% \\ \hline 89\% \\ \hline {\bf t} \ {\bf w}/ \ {\bf s} \\ \hline {\bf sw_2-g} \\ 91\% \\ \hline 93\% \\ 77\% \\ \hline 83\% \\ 97\% \\ \hline 97\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 85% ip 5 sw 72% 50% 66% 67% 95% 75% 57%	76% ip 2-g 555% 63% 76% 28% 79% 76% 76% 76%	97% 80% ip sw_2-g 71% 55% 66% 67% 83% 75% 77%	97% 80% ip sw_2_3-g 71% 56% 66% 69% 83% 75% 77%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	86% 100% 99% t w/ s sw 91% 77% 93% 77% 98% 96% 96% 97% 100%	53% 76% 59% t w/ s 2-g 76% 80% 76% 69% 78% 63% 73%	100% 89% tw/s sw_2-g 91% 80% 93% 77% 97% 100%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 85% ip 5 sw 72% 50% 66% 67% 95% 75% 57% 81%	76% ip 2-g 5.55% 63% 76% 28% 79% 75% 83%	97% 80% ip sw_2-g 55% 66% 67% 83% 75% 75% 77% 92%	$\begin{array}{c c} 97\% \\ \hline 80\% \\ \hline ip \\ sw 2 3-g \\ 71\% \\ 56\% \\ 66\% \\ 69\% \\ 83\% \\ 75\% \\ 77\% \\ 91\% \end{array}$
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	86% 100% 99% t w/ s sw 91% 77% 93% 77% 98% 96% 96% 96%	53% 76% 59% t w/s 2-g 76% 80% 76% 80% 76% 53% 76% 53% 76% 77% 63% 73% 76%	$\begin{array}{c c} 100\% \\ \hline 89\% \\ \hline \mathbf{w/s} \\ \mathbf{sw_2-g} \\ 91\% \\ 80\% \\ 93\% \\ 93\% \\ 97\% \\ 97\% \\ 97\% \\ 100\% \\ 84\% \end{array}$	100% 90% tw/s sw_2.3-g 91% 72% 93% 77% 83% 97% 85% 84%	97% 85% ip 5% 50% 66% 67% 95% 75% 57% 81% 82%	76% ip 2-g 55% 63% 76% 28% 79% 76% 75% 83% 76%	97% 80% ip sw_2-g 71% 55% 66% 67% 83% 75% 92% 82%	97% 80% ip sw_2_3-g 71% 56% 66% 69% 83% 75% 77% 91% 82%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	86% 100% 99% tw/s sw 91% 77% 93% 76% 96% 97% 96% 97% 96% 97% 96% 97% 96% 97%	53% 76% 59% t w/s 2-g 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76%	100% 89% tw/s sw_2-g 91% 80% 93% 77% 83% 97% 97% 97% 97% 77% 84% 77%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 85% ip 5 sw 72% 50% 66% 67% 95% 75% 57% 81% 82% 88%	76% ip 2-g 55% 63% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 78%	97% 80% ip sw_2-g 71% 55% 66% 67% 83% 75% 77% 92% 82%	97% 80% ip sw_2_3-g 71% 56% 66% 69% 83% 75% 77% 91% 82% 88%
Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	86% 100% 99% t w/ s sw 91% 77% 93% 77% 98% 96% 96% 96% 96% 77% 73%	53% 76% 59% t w/ s 2-g 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 75%	$\begin{array}{c c} 100\% \\ \hline 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{s} \\ \mathbf{s} \\ \mathbf{w_22g} \\ 91\% \\ 80\% \\ 93\% \\ 77\% \\ 83\% \\ 97\% \\ 97\% \\ 100\% \\ 84\% \\ 77\% \\ 75\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 85% ip 5 sw 72% 50% 66% 67% 95% 75% 81% 81% 82% 88%	76% ip 2-g 555% 63% 76% 28% 76% 76% 75% 83% 76% 76% 75% 83% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76%	97% 80% ip sw_2-g 71% 55% 66% 67% 83% 75% 75% 92% 82% 88% 50%	97% 80% ip sw_2_3-g 71% 66% 69% 83% 75% 77% 91% 82% 88% 80%
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c} 86\% \\ \hline 86\% \\ 100\% \\ 99\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	53% 76% 59% t w/s 2-g 76% 80% 76% 76% 63% 73% 76% 76% 76% 76% 44% 76% 93% 77% 100% 92% 77% 100% 92% 76% 100% 92% 76% 100% 92% 76% 100% 90% 76% 100% 90% 76% 100% 1	$\begin{array}{c} 100\% \\ 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ 89\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ 80\% \\ 91\% \\ 80\% \\ 93\% \\ 93\% \\ 77\% \\ 83\% \\ 97\% \\ 97\% \\ 100\% \\ 84\% \\ 84\% \\ 77\% \\ 75\% \\ 98\% \\ 71\% \\ 41\% \\ 99\% \\ 84\% \\ 94\% \\ 99\% \\ 80\% \\ 98\% \\ 98\% \\ 97\% \\ 82\% \\ 96\% \\ 58\% \\ 71\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 85% ip 5% 72% 50% 66% 75% 95% 95% 81% 82% 88% 80% 46% 60% 66% 88% 88% 88% 88% 88% 88% 88	76% 76% 76% 2-gg 55% 63% 76% 2-30% 76% 55% 63% 76% 28% 79% 83% 76% 83% 76% 83% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% 77% <	97% 80% ip sw_2-g 71% 55% 66% 67% 83% 75% 77% 92% 82% 85% 50% 47% 75% 79% 71% 76% 79% 71% 76% 81%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
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Asad Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jama Malek Abdullah Jama Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	53% 76% 59% tw/s 2-g 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 93% 93% 93% 92% 77% 90% 76% 100% 76% 90% 76% 90% 76% 90% 76% 82% 59%	$\begin{array}{c c} 100\% \\ 89\% \\ \hline t w/s \\ 89\% \\ \hline t w/s \\ 93\% \\ 93\% \\ 93\% \\ 77\% \\ 83\% \\ 97\% \\ 97\% \\ 100\% \\ 84\% \\ 77\% \\ 77\% \\ 75\% \\ 98\% \\ 98\% \\ 94\% \\ 99\% \\ 80\% \\ 98\% \\ 98\% \\ 97\% \\ 88\% \\ 97\% \\ 88\% \\ 97\% \\ 88\% \\ 96\% \\ 58\% \\ 71\% \\ 81\% \\ 81\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 85% ip 50% 50% 66% 75% 81% 82% 88% 80% 46% 60% 88% 80% 46% 66% 88% 80% 46% 66% 88% 80% 46% 66% 88% 80% 88% 80% 66% 88% 80% 88% 80% 66% 88% 80% 88% 80% 66% 88% 80% 80% 80% 80% 80% 80% 80	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	97% 80% ip sw_2-g 71% 55% 66% 67% 83% 75% 75% 75% 75% 75% 75% 75% 75% 77% 92% 88% 50% 47% 77% 73% 71% 76% 50% 81% 76% 50% 51% 50% 50% 59% 80%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

C.3.6 Google and Bing/BRF

Table C.21: Per level and query macro F-measure when using BRF benchmarks for both.

	t	t	t	t	s	s	s	s
Dataset (Query		2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	62%	40%	65%	65%	92%	39%	92%	92%
Adnan Ibrahim		48%	79%	68%	79%	41%	50%	48%
Amman	56%	56%	56%	56%	68%	38%	57%	45%
Jarrar	61%	59%	61%	61%	41%	64%	41%	39%
Alishaa'	68%	38%	42%	42%	52%	42%	52%	52%
Nahawnd	50%	36%	41%	39%	95%	40%	48%	48%
Qersh	86%	38%	86%	80%	90%	44%	91%	91%
Asia	54%	54%	54%	54%	94%	44%	92%	93%
Shir (Shi3r)	95%	64%	93%	64%	58%	55%	60%	59%
Arafat	43%	43%	43%	43%	91%	47%	52%	91%
Cameron	48%	41%	44%	48%	71%	62%	68%	66%
Maliki	45%	21%	54%	56%	92%	34%	79%	79%
Bagara	85%	57%	84%	84%	60%	46%	42%	42%
Sakhr	30%	32%	50%	50%	64%	40%	4270	4270
Iqteran	46%	43%	56%	72%	46%	45%	88%	88%
Aziz	49%	49%	89%	88%	56%	46%	62%	93%
Ahram	43%	43%	47%	47%	92%	51%	86%	86%
Jalamah	75%	43%	67%	66%	54%	42%	85%	85%
Malek Abdullal		59%	69%	59%	98%	98%	97%	95%
Jamaa Arabiya		52%	90%	90%	86%	85%	91%	90%
Sakakini	58%	39%	74%	58%	68%	50%	61%	61%
Bursa	71%	57%	57%	57%	96%	81%	94%	95%
Ain	49%	49%	43%	43%	77%	41%	86%	86%
Thaheryah	53%	38%	47%	47%	60%	50%	51%	51%
Tarablus	80%	43%	45%	45%	91%	41%	93%	93%
Azhar	39%	38%	39%	44%	75%	40%	70%	70%
Arabiyah	91%	54%	57%	54%	89%	43%	78%	78%
Alabiyan	60%	21%	50%	57%	84%	30%	56%	58%
Athraa'	88%	56%	54%	94%	97%	39%	97%	97%
Qedra	94%	44%	40%	40%	97%	43%	96%	96%
	tw/s	tw/s	tw/s	tw/s	ip	ip	ip	ip
	,					-		
	sw	2-g	sw_2-g	sw_2_3-8		2-g	sw_2-g	
Amazon	sw 73%	2-g 38%	sw_2-g 73%	sw_2_3-	66%	43%	68%	68%
Amazon Adnan Ibrahim	sw 73% 84%	2-g 38% 46%	sw_2-g 73% 66%	sw_2_3-a 73% 56%	66% 56%	43% 55%	68% 52%	68% 60%
Amazon	sw 73%	2-g 38%	sw_2-g 73%	sw_2_3-	66%	43% 55%	68% 52%	68%
Amazon Adnan Ibrahim	sw 73% 84%	2-g 38% 46%	sw_2-g 73% 66%	sw_2_3-a 73% 56%	66% 56%		68% 52% 52%	68% 60%
Amazon Adnan Ibrahim Amman	sw 73% 84% 90%	2-g 38% 46% 52%	sw_2-g 73% 66% 56%	sw_2_3- 73% 56% 56%	66% 56% 52%		68% 52% 52% 90%	68% 60% 52%
Amazon Adnan Ibrahim Amman Jarrar Alishaa'	sw 73% 84% 90% 45% 60%	2-g 38% 46% 52% 62% 42%	sw_2-g 73% 66% 56% 45% 55%	sw_2_3- 73% 56% 56% 45% 55%	66% 56% 52% 66% 37%	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} $	68% 60% 52% 90% 37%
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	sw 73% 84% 90% 45% 60% 90%	2-g 38% 46% 52% 62% 42% 37%	sw_2-g 73% 66% 56% 45% 55% 86%	sw_2_3-6 73% 56% 56% 45% 55% 50%	66% 56% 52% 66% 37% 68%	$\begin{array}{c c} & 43\% \\ & 55\% \\ & 55\% \\ & 47\% \\ & 64\% \\ & 53\% \\ & 34\% \end{array}$	$\begin{array}{c c} & 68\% \\ \hline 52\% \\ \hline 52\% \\ \hline 90\% \\ \hline 37\% \\ \hline 62\% \end{array}$	$ \begin{array}{r} $
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	sw 73% 84% 90% 45% 60% 90% 98%	2-g 38% 46% 52% 62% 42% 37% 45%	sw_2-g 73% 66% 56% 45% 55% 86% 96%	$\begin{array}{ c c c c }\hline sw_2_3-\epsilon\\ \hline 73\%\\ \hline 56\%\\ \hline 56\%\\ \hline 45\%\\ \hline 55\%\\ \hline 50\%\\ \hline 96\%\\ \end{array}$	66% 56% 52% 66% 37% 68% 34%	$\begin{array}{c c} & 43\% \\ & 55\% \\ & 47\% \\ & 64\% \\ & 53\% \\ & 34\% \\ & 41\% \end{array}$	$\begin{array}{c c} & 68\% \\ \hline 52\% \\ \hline 52\% \\ \hline 90\% \\ \hline 37\% \\ \hline 62\% \\ \hline 52\% \end{array}$	$\begin{array}{c} 68\% \\ \hline 60\% \\ \hline 52\% \\ \hline 90\% \\ \hline 37\% \\ \hline 63\% \\ \hline 52\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	sw 73% 84% 90% 45% 60% 90% 98% 100%	2-g 38% 46% 52% 62% 42% 37% 45% 54%	sw_2-g 73% 66% 55% 86% 96% 55%	sw_2_3-g 73% 56% 45% 55% 50% 96% 54%	66% 56% 52% 66% 37% 68% 34% 77%	$\begin{array}{c c} & 43\% \\ & 55\% \\ & 55\% \\ & 47\% \\ & 64\% \\ & 53\% \\ & 53\% \\ & 54\% \\ & 41\% \\ & 54\% \end{array}$	$\begin{array}{c c} & 68\% \\ \hline 52\% \\ \hline 52\% \\ 90\% \\ \hline 37\% \\ \hline 62\% \\ \hline 52\% \\ 94\% \end{array}$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	sw 73% 84% 90% 45% 60% 90% 98% 100% 98%	2-g 38% 46% 52% 62% 42% 37% 45% 54%	sw_2-g 73% 66% 56% 45% 55% 86% 96% 55% 99%	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 52% 52% 66% 37% 68% 34% 77% 90%	5 43% 5 55% 5 47% 5 64% 5 33% 5 34% 5 41% 5 54% 5 54% 5 70%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	sw 73% 84% 90% 45% 60% 90% 98% 100% 98% 99%	2-g 38% 46% 52% 62% 42% 37% 45% 54% 55% 47%	sw_2-g 73% 66% 56% 45% 55% 86% 96% 99%	$\begin{array}{c c} sw_2_3-{}_{2}\\ \hline 73\% \\ 56\% \\ 56\% \\ \hline 55\% \\ 55\% \\ \hline 50\% \\ 96\% \\ 54\% \\ 64\% \\ 99\% \\ \end{array}$	66% 52% 52% 66% 37% 68% 34% 77% 90% 72%	$\begin{array}{c} & 43 \\ \hline 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron	sw 73% 84% 90% 45% 60% 90% 98% 100% 98% 99% 71%	2-g 38% 46% 52% 62% 42% 37% 45% 55% 47% 67%	sw_2-g 73% 66% 55% 45% 55% 96% 55% 99% 99% 54%	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 56% 52% 66% 37% 68% 34% 77% 90% 72% 89%	$\begin{array}{c} & 43\overline{\%} \\ 5 & 55\% \\ 5 & 55\% \\ 5 & 55\% \\ 5 & 47\% \\ 5 & 64\% \\ 5 & 53\% \\ 5 & 34\% \\ 5 & 34\% \\ 5 & 41\% \\ 5 & 54\% \\ 5 & 70\% \\ 5 & 45\% \\ 5 & 61\% \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	sw 73% 84% 90% 45% 60% 90% 98% 100% 98% 99% 71% 99%	2-g 38% 46% 52% 62% 42% 37% 45% 54% 55% 47% 67% 25%	sw_2-g 73% 66% 55% 45% 55% 86% 96% 55% 99% 99% 99% 54%	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 56% 52% 66% 37% 68% 34% 77% 90% 72% 89% 71%	$\begin{array}{c} & 43 \\ \hline & 43 \\ \hline & 55 \\ \hline & 55 \\ \hline & 47 \\ \hline & 64 \\ \hline & 64 \\ \hline & 53 \\ \hline & 54 $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara	sw 73% 84% 90% 45% 60% 90% 98% 100% 98% 99% 99% 99% 99%	2-g 38% 46% 52% 62% 42% 37% 45% 55% 47% 67% 25% 52%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{54\%} \\ \mathbf{98\%} \\ \mathbf{94\%} \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\% \\ 56\% \\ 52\% \\ 66\% \\ 37\% \\ 68\% \\ 34\% \\ 77\% \\ 90\% \\ 90\% \\ 72\% \\ 89\% \\ 71\% \\ 50\% \end{array}$	$\begin{array}{c} & 43 \\ \hline & 43 \\ \hline & 55 \\ \hline & 55 \\ \hline & 47 \\ \hline & 64 \\ \hline & 53 \\ \hline & 53 \\ \hline & 53 \\ \hline & 53 \\ \hline & 54 \\ \hline \hline & 54 \\ \hline & 5$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 99\% \\ 76\% \\ 63\% \\ \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr	$\begin{array}{c} \mathbf{sw} \\ \overline{73\%} \\ 84\% \\ 90\% \\ 45\% \\ 60\% \\ 90\% \\ \overline{90\%} \\ 98\% \\ 100\% \\ 98\% \\ 99\% \\ \overline{99\%} \\ 99\% \\ 99\% \\ 67\% \\ 67\% \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 55% 47% 67% 67% 25% 58%	$\begin{array}{c c} sw_2-g\\ \hline 73\%\\ \hline 66\%\\ 55\%\\ \hline 55\%\\ 55\%\\ \hline 55\%\\ \hline 99\%\\ 99\%\\ \hline 99\%\\ \hline 99\%\\ \hline 94\%\\ 94\%\\ \hline 94\%\\ \hline 94\%\\ \hline 64\%\\ \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 56% 52% 66% 37% 68% 34% 77% 90% 72% 89% 71% 50% 53%	43% 555% 555% 47% 564% 53% 534% 534% 54% 54% 54% 54% 54% 51% 54% 561% 50%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 63\% \\ 56\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{60\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{100\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \end{array}$	2-g 38% 46% 52% 62% 42% 45% 55% 55% 67% 25% 52% 52% 59%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{55\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{96\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{54\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 56% 52% 66% 37% 90% 72% 89% 71% 50% 53%	$\begin{array}{c} 43\%\\ 55\%\\ 55\%\\ 64\%\\ 55\%\\ 64\%\\ 53\%\\ 53\%\\ 54\%\\ 54\%\\ 54\%\\ 5661\%\\ 5661\%\\ 56\%\\ 5663\%\\ 54\%\\ 50\%\\ 5663\%\\ 54\%\\ 57\%\\ 56\%\\ 56\%\\ 56\%\\ 56\%\\ 56\%\\ 56\%\\ 56\%\\ 56$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 63\% \\ 56\% \\ 84\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \\ \mathbf{100\%} \end{array}$	2-g 38% 46% 52% 62% 42% 37% 54% 55% 47% 25% 52% 52% 52% 55%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{55\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{96\%} \\ \mathbf{96\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{99\%} \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 56% 52% 66% 37% 68% 77% 90% 72% 89% 71% 50% 50% 50% 79%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{60\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{71\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{100\%} \\ \mathbf{99\%} \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 54% 54% 67% 25% 52% 58% 59% 55% 48%	$\begin{array}{c c} sw_2-g\\ \hline & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ $	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 56% 52% 66% 37% 68% 34% 77% 90% 72% 89% 72% 72% 50% 53% 80% 79% 66%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 63\% \\ 52\% \\ 90\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 63\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{60\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{98\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{100\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 54% 67% 25% 52% 58% 59% 58% 58% 58%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{56\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{96\%} \\ \mathbf{96\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{94\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{71\%} \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 52% 66% 37% 68% 34% 77% 90% 77% 89% 77% 53% 53% 80% 79% 66% 79%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 63\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{100\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \\ \mathbf{100\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \end{array}$	2-g 38% 46% 52% 62% 42% 37% 54% 54% 55% 47% 25% 52% 58% 59% 55% 48% 58% 58%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{55\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{96\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 52% 66% 37% 68% 34% 77% 90% 72% 89% 71% 53% 89% 71% 53% 80% 79% 66% 79% 45%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \\ 95\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{60\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 45% 45% 45% 45% 55% 55% 58% 58% 58% 98% 98% 97%	$\begin{array}{c c} sw_2-g\\ 73\%\\ 66\%\\ 55\%\\ 55\%\\ 55\%\\ 55\%\\ 55\%\\ 99\%\\ 99\%\\ 54\%\\ 99\%\\ 99\%\\ 64\%\\ 64\%\\ 64\%\\ 99\%\\ 99\%\\ 71\%\\ 99\%\\ 99\%\\ 71\%\\ 99\%\\ 96\%\\ 96\%\\ \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 52% 66% 37% 66% 37% 66% 77% 90% 72% 50% 53% 89% 71% 50% 53% 66% 79% 66% 79% 45% 73%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \\ 95\% \\ 88\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{100\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{97\%} \\ \mathbf{68\%} \\ \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 54% 67% 25% 52% 58% 59% 55% 58% 58% 98% 98% 97%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{56\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{94\%} \\ \mathbf{64\%} \\ \mathbf{66\%} \\ $	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 66\%\\ 37\%\\ 68\%\\ 77\%\\ 90\%\\ 70\%\\ 89\%\\ 71\%\\ 50\%\\ 80\%\\ 79\%\\ 66\%\\ 79\%\\ 45\%\\ 77\%\\ 55\%\\ 80\%\\ 75\%\\ 80\%\\ 80\%\\ 75\%\\ 80\%\\ 80\%\\ 75\%\\ 80\%\\ 75\%$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 82\% \\ 94\% \\ 82\% \\ 90\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \\ 95\% \\ 88\% \\ 57\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{60\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \end{array}$	2-g 38% 46% 52% 62% 42% 37% 54% 54% 54% 67% 25% 52% 58% 59% 55% 48% 98% 98% 97% 50%	$\begin{array}{c c} sw_2-g\\ 73\%\\ 66\%\\ 55\%\\ 55\%\\ 55\%\\ 55\%\\ 99\%\\ 99\%\\ 54\%\\ 99\%\\ 99\%\\ 64\%\\ 64\%\\ 64\%\\ 99\%\\ 99\%\\ 71\%\\ 99\%\\ 99\%\\ 71\%\\ 99\%\\ 96\%\\ 96\%\\ \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 52% 66% 37% 66% 37% 66% 77% 90% 72% 50% 53% 89% 71% 50% 53% 66% 79% 66% 79% 45% 73%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \\ 95\% \\ 88\% \\ 57\% \\ 93\% \\ 93\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{100\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{97\%} \\ \mathbf{68\%} \\ \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 54% 67% 25% 52% 58% 59% 55% 58% 58% 98% 98% 97%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{56\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{94\%} \\ \mathbf{64\%} \\ \mathbf{66\%} \\ $	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 66\%\\ 37\%\\ 68\%\\ 77\%\\ 90\%\\ 70\%\\ 89\%\\ 71\%\\ 50\%\\ 80\%\\ 79\%\\ 66\%\\ 79\%\\ 45\%\\ 77\%\\ 55\%\\ 80\%\\ 75\%\\ 80\%\\ 80\%\\ 75\%\\ 80\%\\ 80\%\\ 75\%\\ 80\%\\ 75\%$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 82\% \\ 94\% \\ 82\% \\ 90\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \\ 95\% \\ 88\% \\ 57\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{60\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{95\%} \\ \mathbf{67\%} \\ \mathbf{66\%} \\ \mathbf{100\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{97\%} \\ \mathbf{97\%} \\ \mathbf{68\%} \\ \mathbf{97\%} \\ \mathbf{47\%} \end{array}$	2-g 38% 46% 52% 62% 42% 54% 54% 54% 55% 47% 25% 58% 59% 55% 48% 48%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{55\%} \\ \mathbf{96\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{64\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{96\%} \\ \mathbf{64\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{89\%} \\ \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 52% 66% 37% 68% 34% 77% 90% 72% 89% 77% 53% 89% 79% 66% 79% 79% 73% 55% 93% 72%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 84\% \\ 98\% \\ 85\% \\ 85\% \\ 80\% \\ 95\% \\ 88\% \\ 57\% \\ 93\% \\ 70\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ \mathbf{84\%} \\ \mathbf{90\%} \\ \mathbf{45\%} \\ \mathbf{60\%} \\ \mathbf{90\%} \\ \mathbf{90\%} \\ \mathbf{98\%} \\ \mathbf{99\%} \\ \mathbf{97\%} \\ \mathbf{68\%} \\ \mathbf{97\%} \\ \mathbf{47\%} \\ \mathbf{98\%} \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 54% 54% 54% 55% 52% 58% 58% 58% 58% 58% 58% 58% 58	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{96\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{71\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{96\%} \\ \mathbf{64\%} \\ \mathbf{93\%} \\ \mathbf{93\%} \\ \mathbf{93\%} \\ \mathbf{53\%} \\ \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	66% 52% 66% 37% 66% 34% 77% 90% 72% 89% 71% 50% 50% 72% 89% 72% 89% 72% 72% 89% 72% 89% 72% 89% 73% 73% 93% 73% 93% 73% 82%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 88\% \\ 55\% \\ 88\% \\ 57\% \\ 93\% \\ 88\% \\ 57\% \\ 81\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jama Arabiya Sakakini Bursa Ain Thaheryah Tarablus	$\begin{array}{c} \mathbf{sw} \\ \mathbf{sw} \\ 73\% \\ 84\% \\ 90\% \\ 45\% \\ 60\% \\ 90\% \\ 98\% \\ 99\% \\ 100\% \\ 98\% \\ 99\% \\ 71\% \\ 99\% \\ 99\% \\ 71\% \\ 66\% \\ 66\% \\ 66\% \\ 100\% \\ 99\% \\ 99\% \\ 97\% \\ 68\% \\ 97\% \\ 47\% \\ 98\% \\ 99\% \\ 99\% \end{array}$	2-g 38% 46% 52% 62% 42% 37% 54% 54% 54% 67% 25% 52% 58% 58% 58% 58% 58% 58% 58% 58	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{sw_2-g} \\ 73\% \\ 66\% \\ 55\% \\ 55\% \\ 55\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 94\% \\ 94\% \\ 99\% \\ 99\% \\ 99\% \\ 91\% \\ 99\% \\ 99\% \\ 90\% \\ 99\% \\ 90\% \\ 80\% \\ 80\% \\ 80\% \\ 85\% \\$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 66\%\\ 37\%\\ 66\%\\ 77\%\\ 90\%\\ 77\%\\ 90\%\\ 72\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 63\% \\ 56\% \\ 84\% \\ 88\% \\ 67\% \\ 80\% \\ 95\% \\ 88\% \\ 57\% \\ 93\% \\ 70\% \\ 81\% \\ 81\% \\ 48\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ 84\% \\ 90\% \\ 45\% \\ 60\% \\ 90\% \\ 98\% \\ 100\% \\ 98\% \\ 100\% \\ 99\% \\ 99\% \\ 100\% \\ 99\% \\ 99\% \\ 67\% \\ 66\% \\ 100\% \\ 99\% \\ 99\% \\ 97\% \\ 93\% \\ 99\% \\ 97\% \\ 47\% \\ 98\% \\ 99\% \\ 72\% \\ \end{array}$	2-g 38% 46% 52% 62% 42% 37% 54% 54% 54% 47% 67% 25% 58% 59% 55% 48% 98% 98% 98% 98% 98% 48% 46% 44%	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{55\%} \\ \mathbf{45\%} \\ \mathbf{55\%} \\ \mathbf{96\%} \\ \mathbf{96\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{64\%} \\ \mathbf{64\%} \\ \mathbf{99\%} \\ \mathbf{99\%} \\ \mathbf{93\%} \\ \mathbf{89\%} \\ \mathbf{53\%} \\ \mathbf{53\%} \\ \mathbf{53\%} \\ \mathbf{53\%} \\ \mathbf{72\%} \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 68\%\\ 37\%\\ 68\%\\ 77\%\\ 90\%\\ 72\%\\ 89\%\\ 71\%\\ 50\%\\ 53\%\\ 66\%\\ 79\%\\ 45\%\\ 73\%\\ 72\%\\ 88\%\\ 79\%\\ 45\%\\ 73\%\\ 72\%\\ 82\%\\ 82\%\\ 82\%\\ 41\%\\ 57\%\end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 52\% \\ 94\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 63\% \\ 63\% \\ 63\% \\ 63\% \\ 63\% \\ 63\% \\ 84\% \\ 98\% \\ 84\% \\ 98\% \\ 80\% \\ 95\% \\ 84\% \\ 57\% \\ 80\% \\ 95\% \\ 84\% \\ 55\% \\ 84\% \\ 59\% \\ 81\% \\ 65\% \\ 59\% \\ 80\% \\ 85\% \\$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ 84\% \\ 90\% \\ 45\% \\ 60\% \\ 90\% \\ 98\% \\ 99\% \\ 71\% \\ 99\% \\ 99\% \\ 71\% \\ 66\% \\ 66\% \\ 66\% \\ 66\% \\ 100\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 72\% \\ 57\% \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 45% 54% 55% 55% 55% 55	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{sw_2-g} \\ 73\% \\ 66\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 64\% \\ 64\% \\ 64\% \\ 64\% \\ 64\% \\ 64\% \\ 64\% \\ 64\% \\ 64\% \\ 64\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 71\% \\ 99\% \\ 99\% \\ 94\% \\ 53\% \\ 45\% \\ 72\% \\ 94\% \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 66\%\\ 34\%\\ 77\%\\ 90\%\\ 72\%\\ 89\%\\ 71\%\\ 50\%\\ 89\%\\ 71\%\\ 80\%\\ 53\%\\ 80\%\\ 53\%\\ 80\%\\ 53\%\\ 80\%\\ 55\%\\ 99\%\\ 45\%\\ 79\%\\ 82\%\\ 41\%\\ 36\%\\ 36\%\\ 36\%\end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\%\\ 60\%\\ 52\%\\ 90\%\\ 63\%\\ 52\%\\ 90\%\\ 63\%\\ 52\%\\ 94\%\\ 63\%\\ 57\%\\ 82\%\\ 90\%\\ 63\%\\ 63\%\\ 63\%\\ 63\%\\ 63\%\\ 63\%\\ 84\%\\ 67\%\\ 88\%\\ 98\%\\ 67\%\\ 88\%\\ 95\%\\ 88\%\\ 57\%\\ 88\%\\ 57\%\\ 88\%\\ 55\%\\ 88\%\\ 55\%\\ 36\%\\ 36\%\\ 36\%\\ 36\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 36\%\\ 36\%\\ 36\%\\ 37\%\\ 37\%\\ 37\%\\ 37\%\\ 37\%\\ 37\%\\ 37\%\\ 37$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ 84\% \\ 90\% \\ 45\% \\ 60\% \\ 90\% \\ 98\% \\ 99\% \\ 100\% \\ 98\% \\ 99\% \\ 71\% \\ 66\% \\ 66\% \\ 100\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 97\% \\ 47\% \\ 98\% \\ 99\% \\ 72\% \\ 57\% \\ 96\% \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 54% 54% 67% 25% 52% 58% 59% 55% 58% 59% 50% 84% 48% 48% 48% 44% 40% 54% 46% 32%	$\begin{array}{c c} sw_2-g\\ \hline & sw_2-g\\ \hline & 73\%\\ \hline & 66\%\\ \hline & 45\%\\ \hline & 55\%\\ \hline & 55\%\\ \hline & 99\%\\ \hline & 94\%\\ \hline & 64\%\\ \hline & 64\%\\ \hline & 64\%\\ \hline & 99\%\\ \hline & 99\%\\ \hline & 71\%\\ \hline & 99\%\\ \hline & 96\%\\ \hline & 64\%\\ \hline & 89\%\\ \hline & 53\%\\ \hline & 45\%\\ \hline & 72\%\\ \hline & 72\%\\ \hline & 72\%\\ \hline & 94\%\\ \hline & 96\%\\ \hline \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 68\%\\ 37\%\\ 90\%\\ 77\%\\ 90\%\\ 72\%\\ 89\%\\ 71\%\\ 50\%\\ 80\%\\ 79\%\\ 50\%\\ 79\%\\ 50\%\\ 79\%\\ 50\%\\ 79\%\\ 70\%\\ 80\%\\ 79\%\\ 75\%\\ 93\%\\ 72\%\\ 93\%\\ 72\%\\ 55\%\\ 93\%\\ 72\%\\ 55\%\\ 55\%\\ 93\%\\ 52\%\\ 55\%\\ 55\%\\ 55\%\\ 55\%\\ 55\%\\ 55\%\\ 55$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 82\% \\ 90\% \\ 76\% \\ 82\% \\ 90\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \\ 98\% \\ 67\% \\ 80\% \\ 95\% \\ 88\% \\ 57\% \\ 80\% \\ 81\% \\ 81\% \\ 81\% \\ 59\% \\ 52\% \\ 52\% \end{array}$
Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad Athraa'	$\begin{array}{c} \mathbf{sw} \\ \mathbf{sw} \\ 73\% \\ 84\% \\ 90\% \\ 45\% \\ 60\% \\ 90\% \\ 98\% \\ 99\% \\ 100\% \\ 98\% \\ 99\% \\ 71\% \\ 99\% \\ 95\% \\ 67\% \\ 66\% \\ 100\% \\ 100\% \\ 99\% \\ 99\% \\ 99\% \\ 97\% \\ 47\% \\ 98\% \\ 99\% \\ 72\% \\ 57\% \\ 96\% \\ 99\% \end{array}$	2-g 38% 46% 52% 62% 42% 37% 54% 54% 54% 67% 25% 52% 58% 59% 58% 98% 98% 97% 50% 84% 48% 46% 44% 40% 54% 55% 84% 55% 84% 55% 84% 55% 84% 55% 84% 55% 55% 84% 55% 54% 54% 55% 54% 55% 54% 54	$\begin{array}{c} \mathbf{sw_2-g} \\ \mathbf{sw_2-g} \\ \mathbf{73\%} \\ \mathbf{66\%} \\ \mathbf{66\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{55\%} \\ \mathbf{99\%} \\ \mathbf{94\%} \\ \mathbf{99\%} \\ \mathbf{90\%} \\ \mathbf{100\%} \\ 100\%$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 66\%\\ 34\%\\ 77\%\\ 90\%\\ 72\%\\ 72\%\\ 72\%\\ 72\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70\%\\ 70$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 52\% \\ 94\% \\ 57\% \\ 82\% \\ 90\% \\ 76\% \\ 82\% \\ 90\% \\ 63\% \\ 63\% \\ 63\% \\ 66\% \\ 84\% \\ 98\% \\ 88\% \\ 85\% \\ 85\% \\ 81\% \\ 95\% \\ 81\% \\ 81\% \\ 55\% \\ 81\% \\ 55\% \\ 91\% \\ 91\% \end{array}$
Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c} \mathbf{sw} \\ \mathbf{73\%} \\ 84\% \\ 90\% \\ 45\% \\ 60\% \\ 90\% \\ 98\% \\ 99\% \\ 100\% \\ 98\% \\ 99\% \\ 71\% \\ 66\% \\ 66\% \\ 100\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 97\% \\ 47\% \\ 98\% \\ 99\% \\ 72\% \\ 57\% \\ 96\% \end{array}$	2-g 38% 46% 52% 62% 42% 37% 45% 54% 54% 54% 67% 25% 52% 58% 59% 58% 59% 58% 58% 58% 58% 58% 58% 48% 48% 48% 48% 48% 52% 52% 52% 52% 52% 52% 52% 52	$\begin{array}{c c} sw_2-g\\ \hline & sw_2-g\\ \hline & 73\%\\ \hline & 66\%\\ \hline & 45\%\\ \hline & 55\%\\ \hline & 55\%\\ \hline & 99\%\\ \hline & 94\%\\ \hline & 64\%\\ \hline & 64\%\\ \hline & 64\%\\ \hline & 99\%\\ \hline & 99\%\\ \hline & 71\%\\ \hline & 99\%\\ \hline & 96\%\\ \hline & 64\%\\ \hline & 89\%\\ \hline & 53\%\\ \hline & 45\%\\ \hline & 72\%\\ \hline & 72\%\\ \hline & 72\%\\ \hline & 94\%\\ \hline & 96\%\\ \hline \end{array}$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c} 66\%\\ 56\%\\ 52\%\\ 66\%\\ 37\%\\ 66\%\\ 37\%\\ 90\%\\ 77\%\\ 90\%\\ 72\%\\ 89\%\\ 71\%\\ 50\%\\ 80\%\\ 79\%\\ 66\%\\ 79\%\\ 45\%\\ 73\%\\ 80\%\\ 79\%\\ 66\%\\ 79\%\\ 45\%\\ 77\%\\ 93\%\\ 72\%\\ 82\%\\ 41\%\\ 57\%\\ 93\%\\ 52\%\\ 82\%\\ 41\%\\ 55\%\\ 82\%\\ 55\%\\ 82\%\\ 82\%\\ 55\%\\ 82\%\\ 82\%\\ 82\%\\ 82\%\\ 82\%\\ 82\%\\ 82\%\\ 82$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 68\% \\ 60\% \\ 52\% \\ 90\% \\ 37\% \\ 63\% \\ 52\% \\ 94\% \\ 82\% \\ 90\% \\ 76\% \\ 82\% \\ 90\% \\ 63\% \\ 56\% \\ 84\% \\ 98\% \\ 67\% \\ 80\% \\ 98\% \\ 67\% \\ 80\% \\ 95\% \\ 88\% \\ 57\% \\ 80\% \\ 81\% \\ 81\% \\ 81\% \\ 59\% \\ 52\% \\ 52\% \end{array}$

	t	t	t	t	s	s	s	s
Dataset (Query		2-g	sw_2-g	sw_2_3-g	\mathbf{sw}	2-g	sw_2-g	sw_2_3-g
Amazon	67%	51%	69%	69%	92%	53%	92%	92%
Adnan Ibrahim	n 77%	58%	80%	71%	79%	52%	56%	54%
Amman	62%	62%	62%	62%	71%	52%	63%	56%
Jarrar	66%	63%	66%	66%	53%	68%	53%	51%
Alishaa'	71%	52%	54%	54%	60%	54%	60%	60%
Nahawnd	55%	51%	51%	52%	95%	53%	57%	57%
Qersh	87%	52%	87%	81%	91%	55%	92%	92%
Asia	60%	60%	60%	60%	95%	55%	93%	93%
Shir (Shi3r)	96%	68%	93%	68%	64%	62%	65%	64%
Arafat	55%	55%	55%	55%	92%	56%	60%	91%
Cameron	56%	54%	54%	56%	73%	66%	71%	69%
Maliki	55%	35%	65%	64%	92%	42%	80%	80%
Baqara	85%	63%	85%	85%	64%	56%	53%	53%
Sakhr	37%	38%	51%	51%	70%	47%	60%	60%
Iqteran	55%	55%	61%	74%	57%	56%	88%	88%
Aziz	55%	55%	90%	89%	62%	57%	67%	94%
Ahram	53%	55%	57%	57%	92%	59%	86%	86%
Jalamah	76%	55%	70%	70%	61%	54%	86%	86%
Malek Abdulla	h 86%	62%	69%	61%	98%	98%	98%	96%
Jamaa Arabiya		60%	91%	90%	86%	86%	92%	91%
Sakakini	64%	51%	76%	64%	71%	59%	66%	66%
Bursa	72%	61%	61%	61%	97%	82%	95%	95%
Ain	57%	57%	55%	55%	79%	54%	86%	86%
Thaheryah	61%	52%	57%	57%	65%	$\frac{54\%}{59\%}$	59%	59%
Tarablus	81%	55%	51%	51%	92%	54%	93%	93%
Azhar	51%	52%	51%	53%	76%	53%	72%	72%
Arabiyah	91%	61%	63%	61%	90%	55%	79%	79%
				61%	84%	39%	62%	63%
Asad	63%	36%	61%					
Athraa'	89%	62%	59%	94%	98%	52%	98%	98%
Athraa' Qedra	89% 95% t w/ s	62% 55% t w/ s	59% 52% tw/s	94% 52% t w/ s	98% 97% ip	52% 55% ip	98% 97% ip	98% 97% ip
Athraa' Qedra Dataset (Query)	89% 95% t w/ s sw	62% 55% t w/ s 2-g	59% 52% t w/ s sw_2-g	94% 52% t w/ s sw_2_3-g	98% 97% ip s sw	52% 55% ip 2-g	98% 97% ip sw_2-g	98% 97% ip sw_2_3
Athraa' Qedra Dataset (Query) Amazon	89% 95% t w/ s sw 75%	62% 55% t w/ s 2-g 52%	59% 52% t w/ s sw_2-g 75%	94% 52% tw/s sw_2_3-g 75%	98% 97% ip 5 sw 70%	52% 55% ip 2-g 6 55%	98% 97% ip sw_2-g 71%	98% 97% ip sw_2_3 71%
Athraa' Qedra Dataset (Query) Amazon	89% 95% t w/ s sw	62% 55% t w/ s 2-g 52% 54%	59% 52% t w/ s sw_2-g	94% 52% t w/ s sw_2_3-g 75% 58%	98% 97% ip s sw	52% 55% ip 2-g 6 55%	98% 97% ip sw_2-g 71%	98% 97% ip sw_2_3
Athraa' Qedra Dataset (Query) Amazon	89% 95% t w/ s sw 75%	62% 55% t w/ s 2-g 52%	59% 52% t w/ s sw_2-g 75%	94% 52% tw/s sw_2_3-g 75%	98% 97% ip 5 sw 70%	52% 55% ip 2-g 6 55% 6 59%	98% 97% ip sw_2-g 71% 52%	98% 97% ip sw_2_3 71%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	89% 95% t w/ s sw 75% 85%	62% 55% t w/ s 2-g 52% 54%	59% 52% tw/s sw_2-g 75% 67%	94% 52% t w/ s sw_2_3-g 75% 58%	98% 97% ip 5 sw 70% 59%	52% 55% ip 2-g 55% <	98% 97% ip sw_2-g 71% 52% 58%	98% 97% ip sw_2_3 71% 61%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	89% 95% t w/ s sw 75% 85% 91%	62% 55% t w/ s 2-g 52% 54% 59%	59% 52% tw/s sw_2-g 75% 67% 61%	94% 52% t w/ s sw_2_3-g 75% 58% 61%	98% 97% ip sw 70% 59% 58%	52% 55% ip 2-g 55% 55% 55% 55% 55% 55% 55% 55% 55% 65% 55% 55% 68%	98% 97% ip 5 w_2-g 52% 58% 90%	98% 97% ip sw_2_3 71% 61% 58%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	89% 95% t w/ s sw 75% 85% 91% 55% 65%	62% 55% t w/ s 2-g 52% 54% 59% 65% 54%	59% 52% tw/s sw_2-g 75% 67% 61% 55% 62%	94% 52% t w/ s sw_2_3-g 75% 61% 55% 62%	98% 97% ip 5 sw 70% 59% 58% 69% 52%	52% 55% ip 2-g 55% 55% 55% 55% 55% 55% 55% 55% 55% 6 55% 68% 61%	98% 97% ip sw_2-g 71% 52% 58% 90% 52%	98% 97% ip sw_2_3 71% 61% 58% 90% 52%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	89% 95% t w/s sw 75% 91% 55% 65% 91%	62% 55% t w/ s 2-g 52% 54% 59% 65% 54% 51%	59% 52% t w/s sw_2-g 75% 67% 61% 55% 62% 86%	$\begin{array}{c c} 94\% \\ \hline 52\% \\ \hline $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	98% 97% ip 5 sw 70% 59% 58% 69% 52% 71%	52% 55% ip 2-g 55% 6 55% 6 50% 6 50% 6 6 6 6 6 6 6 6 6 6 5 7 6 6 6 5 7	98% 97% ip sw_2-g 71% 52% 58% 90% 52% 600% 52% 600% 600% 600% 600%	98% 97% ip sw_2_3 71% 61% 58% 90% 52% 67%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	89% 95% t w/ s sw 75% 85% 91% 55% 65% 91% 98%	62% 55% t w/ s 2-g 52% 54% 59% 65% 54% 51% 56%	59% 52% tw/s sw_2-g 75% 61% 55% 62% 86% 97%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip 5 sw 70% 59% 58% 69% 52% 71% 51%	52% 55% ip 2-g 6 55% 6 55% 6 55% 6 55% 6 68% 6 61% 6 51% 6 53%	98% 97% ip sw_2-g 52% 52% 52% 6 52% 6 59%	98% 97% ip sw_2_3 71% 61% 58% 90% 52% 67% 59%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	89% 95% t w/s sw 75% 85% 91% 55% 91% 98% 100%	62% 55% t w/ s 2-g 52% 54% 59% 65% 54% 51% 56% 61%	$\begin{array}{c c} 59\% \\ \hline 52\% \\ \hline 52\% \\ \hline sw_2-g \\ 75\% \\ \hline 67\% \\ 61\% \\ \hline 86\% \\ 86\% \\ 97\% \\ \hline 61\% \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip 5 sw 70% 59% 58% 69% 52% 71% 51% 79%	52% 55% ip 2-g 6 55% 6 55% 6 55% 6 55% 6 55% 6 68% 6 61% 6 53% 6 61% 6 53% 6 61% 6 61% 6 61% 6 61% 6 61% 6 61%	98% 97% ip sw_2-g 52% 52% 67% 90% 52% 67% 59% 95%	98% 97% ip sw_23 71% 61% 90% 52% 67% 59% 94%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	89% 95% t w/ s sw 75% 85% 91% 55% 65% 91% 98% 100% 99%	62% 55% t w/ s 2-g 52% 54% 59% 65% 54% 51% 65% 66% 61% 62%	$\begin{array}{c c} 59\% \\ \hline 52\% \\ \hline t w/s \\ sw_2 g \\ 75\% \\ \hline 67\% \\ 61\% \\ 55\% \\ 62\% \\ 86\% \\ 97\% \\ 91\% \\ 61\% \\ 99\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip 5 sw 70% 59% 58% 69% 52% 71% 51% 79% 91%	52% ip 2-g 55% 6 55% 6 55% 6 6 55% 6 6 55% 6 55% 6 6 6 6 6 6 6 6 6 6 6 72%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip sw_2 3 71% 61% 58% 90% 52% 67% 59% 94% 63%
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Athraa' Qedra Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 62\% \\ 55\% \\ \hline w/s \\ 2-g \\ 52\% \\ 54\% \\ 59\% \\ 65\% \\ 54\% \\ 51\% \\ 56\% \\ 51\% \\ 66\% \\ 51\% \\ 66\% \\ 62\% \\ 56\% \\ 61\% \\ 62\% \\ 56\% \\ 64\% \\ 59\% \\ 64\% \\ 58\% \\ 64\% \\ 58\% \\ 58\% \\ 58\% \\ 58\% \\ 58\% \\ 58\% \\ 57\% \\ 57\% \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 98\% \\ \hline 98\% \\ \hline 97\% \\ \hline 90\% \\ \hline 59\% \\ \hline 79\% \\ \hline 71\% \\ \hline 90\% \\ \hline 50\% \\ \hline 80\% \hline$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip sw_2 3 71% 61% 52% 67% 90% 63% 90% 63% 90% 63% 90% 67% 67% 69% 85% 99% 69% 81% 95% 88% 58% 94% 73%
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Athraa' Qedra Qedra Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jama Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	$\begin{array}{c c} & 89\% \\ \hline & 89\% \\ \hline & 95\% \\ \hline & 95\% \\ \hline & sw \\ 75\% \\ \hline & 85\% \\ 91\% \\ 55\% \\ \hline & 65\% \\ 91\% \\ 98\% \\ 100\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 98\% \\ 99\% \\ 98\% \\ 99\% \\ 98\% \\ 99\% \\ 98\% \\ 99\% \\ 99\% \\ 99\% \\ 99\% \\ 71\% \\ 99\% \\ 99\% \\ 74\% \\ \end{array}$	$\begin{array}{c} 62\%\\ 55\%\\ \hline t \ w/\ s\\ 2-g\\ 52\%\\ 54\%\\ 54\%\\ 55\%\\ 54\%\\ 56\%\\ 61\%\\ 62\%\\ 56\%\\ 61\%\\ 62\%\\ 56\%\\ 61\%\\ 62\%\\ 58\%\\ 58\%\\ 57\%\\ 64\%\\ 99\%\\ 99\%\\ 99\%\\ 99\%\\ 99\%\\ 59\%\\ 55\%\\ 57\%\\ 55\%\\ 55\%\\ 55\%\\ 53\%\\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$
Athraa' Qedra Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 62\%\\ 55\%\\ \hline\\ \mathbf{t}\ \mathbf{w}/\ \mathbf{s}\\ 2-\mathbf{g}\\ 52\%\\ 54\%\\ 55\%\\ 54\%\\ 55\%\\ 65\%\\ 54\%\\ 51\%\\ 66\%\\ 54\%\\ 61\%\\ 62\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 58\%\\ 64\%\\ 58\%\\ 57\%\\ 57\%\\ 57\%\\ 57\%\\ 57\%\\ 55\%\\ 53\%\\ 61\%\\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 98\% \\ \hline 98\% \\ \hline 97\% \\ \hline 70\% \\ \hline 59\% \\ \hline 59\% \\ \hline 59\% \\ \hline 59\% \\ \hline 70\% \\ \hline 59\% \\ \hline 59\% \\ \hline 70\% \\ \hline 70\% \\ \hline 91\% \\ \hline 71\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 81\% \\ \hline 81\% \\ \hline 90\% \\ \hline 81\% \hline 81\%$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip sw_23 71% 61% 58% 90% 52% 67% 90% 52% 67% 94% 63% 90% 63% 90% 63% 90% 63% 90% 67% 69% 85% 99% 69% 81% 95% 88% 58% 94% 73% 82% 52% 61% 51%
Athraa' Qedra Qadra Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah Asad	$\begin{array}{c c} & 89\% \\ & 95\% \\ \hline 95\% \\ \hline 95\% \\ \hline 85\% \\ \hline 91\% \\ 55\% \\ \hline 65\% \\ \hline 91\% \\ 99\% \\ \hline 73\% \\ \hline 99\% \\ \hline 99\% \\ \hline 70\% \\ 70\% \\ \hline 70\% \\ \hline 70\% \\ 70\% \\ \hline 70\% \\ 70\% \\ \hline 70\% \\ 7$	$\begin{array}{c} 62\% \\ 55\% \\ \hline t w/s \\ 2-g \\ 52\% \\ 54\% \\ 59\% \\ 54\% \\ 56\% \\ 54\% \\ 56\% \\ 66\% \\ 61\% \\ 62\% \\ 66\% \\ 61\% \\ 62\% \\ 66\% \\ 61\% \\ 64\% \\ 58\% \\ 64\% \\ 99\% \\ 98\% \\ 64\% \\ 99\% \\ 98\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 55\% \\ 61\% \\ 6$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 98\% \\\hline 97\% \\\hline 97\% \\\hline 97\% \\\hline 97\% \\\hline 97\% \\\hline 88w 2 3 \\\hline 71\% \\\hline 61\% \\\hline 88\% \\\hline 90\% \\\hline 58\% \\\hline 90\% \\\hline 52\% \\\hline 67\% \\\hline 67\% \\\hline 63\% \\\hline 94\% \\\hline 63\% \\\hline 994\% \\\hline 67\% \\\hline 66\% \\\hline 85\% \\\hline 990\% \\\hline 66\% \\\hline 85\% \\\hline 990\% \\\hline 67\% \\\hline 66\% \\\hline 85\% \\\hline 990\% \\\hline 76\% \\\hline 94\% \\\hline 76\% \\\hline 85\% \\\hline 94\% \\\hline 82\% \\\hline 52\% \\\hline 61\% \\\hline 61\% \\\hline 63\% \\\hline 51\% \\\hline 63\% \\\hline 63\% \\\hline $
Athraa' Qedra Qedra Qataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Arabiyah	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c} 62\%\\ 55\%\\ \hline\\ \mathbf{t}\ \mathbf{w}/\ \mathbf{s}\\ 2-\mathbf{g}\\ 52\%\\ 54\%\\ 55\%\\ 54\%\\ 55\%\\ 65\%\\ 54\%\\ 51\%\\ 66\%\\ 54\%\\ 61\%\\ 62\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 64\%\\ 58\%\\ 58\%\\ 64\%\\ 58\%\\ 57\%\\ 57\%\\ 57\%\\ 57\%\\ 57\%\\ 55\%\\ 53\%\\ 61\%\\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 98\% \\ \hline 98\% \\ \hline 97\% \\ \hline 70\% \\ \hline 59\% \\ \hline 59\% \\ \hline 59\% \\ \hline 59\% \\ \hline 70\% \\ \hline 59\% \\ \hline 59\% \\ \hline 70\% \\ \hline 70\% \\ \hline 91\% \\ \hline 71\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 50\% \\ \hline 81\% \\ \hline 90\% \\ \hline 81\% \\ \hline 81\% \\ \hline 90\% \\ \hline 81\% \hline 81\%$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Table C.22: Per level and query weighted recall when using BRF benchmarks for both.

Table C.23: Per level and query weighted precision when using BRF benchmarks for both.

	t	t	t	t	s	s	s	s
Dataset (Query)		2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amazon	80%	54%	81%	81%	93%	76%	93%	93%
Adnan Ibrahim		77%	81%	81%	81%	55%	60%	57%
Amman	72%	72%	72%	72%	81%	76%	79%	77%
Jarrar	80%	70%	80%	80%	55%	80%	55%	49%
Alishaa'	82%	76%	76%	76%	73%	76%	78%	78%
Nahawnd	59%	75%	53%	59%	95%	76%	71%	71%
Qersh	89%	76%	89%	85%	91%	72%	92%	92%
Asia	70%	70%	70%	70%	95%	76%	93%	94%
Shir (Shi3r)	96%	80%	94%	80%	79%	78%	79%	79%
Arafat	76%	76%	76%	76%	92%	66%	78%	91%
Cameron	65%	76%	65%	65%	77%	77%	79%	78%
Maliki	45%	31%	49%	66%	94%	68%	87%	87%
Baqara	88%	79%	87%	87%	74%	70%	59%	59%
Sakhr	54%	57%	62%	62%	82%	80%	43%	43%
Iqteran	64%	76%	72%	82%	77%	76%	89%	89%
Aziz	58%	58%	91%	91%	78%	77%	80%	94%
	60%		77%	77%	92%	77%		87%
Ahram		76%					87%	
Jalamah	79%	76%	81%	81%	72%	67%	89%	89%
Malek Abdullah		66%	70%	63%	98%	98%	98%	96%
Jamaa Arabiya	89%	78%	92%	92%	89%	88%	93%	92%
Sakakini	79%	52%	84%	79%	82%	77%	80%	80%
Bursa	77%	69%	69%	69%	97%	86%	95%	95%
Ain	69%	69%	76%	76%	85%	76%	89%	89%
Thaheryah	78%	76%	77%	77%	75%	75%	75%	75%
Tarablus	85%	76%	51%	51%	93%	76%	93%	93%
Azhar	52%	61%	52%	57%	82%	65%	79%	79%
Arabiyah	92%	76%	79%	78%	90%	76%	85%	85%
Asad	66%	44%	46%	65%	89%	60%	61%	64%
Asad Athraa'	66%	44% 78%	46% 64%	65% 94%	89% 98%	60%	61% 98%	64% 98%
Athraa'	90%	78%	64%	94%	98%	59%	98%	98%
	90% 95%	78% 76%	$\frac{64\%}{59\%}$	$94\% \\ 59\%$	98% 97%	59% 76%	98% 97%	98% 97%
Athraa' Qedra	90% 95% t w/ s	78% 76% tw/s	64% 59% tw/s	94% 59% tw/s	98% 97% ip	59% 76% ip	98% 97% ip	98% 97% ip
Athraa' Qedra Dataset (Query)	90% 95% t w/ s sw	78% 76% tw/s 2-g	64% 59% tw/s sw_2-g	94% 59% t w/s sw_2_3-	98% 97% ip g sw	59% 76% ip 2-g	98% 97% ip sw_2-g	98% 97% ip sw_2_3-
Athraa' Qedra Dataset (Query) Amazon	90% 95% t w/ s sw 81%	78% 76% t w/ s 2-g 61%	64% 59% t w/ s sw_2-g 81%	94% 59% t w/ s sw_2_3- 81%	98% 97% ip g sw 81%	59% 76% ip 2-g 5 76%	98% 97% ip sw_2-g 81%	98% 97% ip sw_2_3 - 81%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim	90% 95% t w/ s sw 81% 87%	78% 76% t w/s 2-g 61% 57%	64% 59% t w/ s sw_2-g 81% 68%	94% 59% t w/ s sw_2_3 - 81% 60%	98% 97% g sw 81% 60%	59% 76% ip 2-g 76% 6 76%	98% 97% ip sw_2-g 81% 52%	98% 97% ip sw_2_3- 81% 63%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman	90% 95% t w/ s sw 81% 87% 91%	78% 76% t w/s 2-g 61% 57% 70%	64% 59% t w/ s sw_2-g 81% 68% 72%	94% 59% t w/ s sw_2_3- 81% 60% 72%	98% 97% g sw 81% 60% 66%	59% 76% ip 2-g 76% 565% 571%	98% 97% ip sw_2-g 81% 52% 666%	98% 97% ip sw_2_3- 81% 63% 66%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar	90% 95% t w/ s sw 81% 87% 91% 65%	78% 76% t w/ s 2-g 61% 57% 70% 69%	64% 59% tw/s sw_2-g 81% 68% 72% 65%	94% 59% t w/ s sw_2_3- 81% 60% 72% 65%	98% 97% g sw 81% 60% 66% 80%	59% 76% ip 2-g 6 76% 6 76% 6 76% 6 80%	98% 97% ip sw_2-g 81% 52% 66% 92%	98% 97% ip sw_2_3- 81% 63% 66% 92%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa'	90% 95% t w/ s 81% 87% 91% 65% 79%	78% 76% t w/s 2-g 61% 57% 70% 69% 76%	64% 59% sw_2-g 81% 68% 72% 65% 78%	94% 59% t w/s sw_2_3- 81% 60% 72% 65% 78%	98% 97% ip g sw 81% 60% 66% 80% 75%	59% 76% ip 2-g 6 76% 5 76% 6 76% 6 71% 6 80% 6 78%	98% 97% ip sw_2-g 81% 52% 666% 92% 75%	98% 97% ip sw_2_3- 81% 63% 66% 92% 75%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd	90% 95% t w/ s sw 81% 87% 91% 65% 79% 91%	78% 76% t w/s 2-g 61% 57% 70% 69% 76% 54%	64% 59% sw_2-g 81% 68% 72% 65% 78% 87%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline {\bf t} \ {\bf w/s} \\ {\bf sw_2} \ {\bf 3-} \\ 81\% \\ \hline 60\% \\ 72\% \\ 65\% \\ 78\% \\ \hline 59\% \end{array}$	98% 97% ip g sw 81% 60% 66% 80% 75% 81%	59% 76% ip 2-g 5 76% 6 5% 5 71% 5 80% 5 78% 5 75%	98% 97% ip sw_2-g 81% 52% 66% 92% 75% 80%	98% 97% ip 81% 63% 66% 92% 75% 80%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	90% 95% t w/ s sw 81% 91% 65% 79% 91% 98%	78% 76% t w/ s 2-g 61% 57% 70% 69% 76% 54% 76%	64% 59% sw_2-g 81% 68% 72% 65% 78% 87% 97%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2_3-} \\ 81\% \\ \hline 60\% \\ \hline 72\% \\ \hline 65\% \\ \hline 65\% \\ \hline 59\% \\ 97\% \end{array}$	98% 97% g sw 81% 66% 80% 75% 81% 75%	59% 76% ip 2-g 5 76% 5 76% 5 76% 5 71% 5 80% 5 75% 5 62%	98% 97% ip sw_2-g 0 81% 0 52% 0 66% 0 92% 0 80% 0 80% 0 71%	98% 97% ip 81% 63% 66% 92% 75% 80% 71%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	90% 95% t w/ s sw 81% 87% 91% 65% 79% 91% 91% 98% 100%	78% 76% t w/s 2-g 61% 57% 69% 76% 54% 76% 72%	64% 59% sw_2-g 81% 68% 72% 65% 78% 97% 71%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline {\bf t w/s} \\ {\bf sw_2_3-} \\ 81\% \\ \hline 60\% \\ 72\% \\ 65\% \\ \hline 78\% \\ 59\% \\ 97\% \\ 97\% \\ 70\% \end{array}$	98% 97% g sw 81% 60% 66% 80% 75% 81% 75% 81% 75% 85%	59% 76% ip 2-g 5 65% 5 65% 5 65% 5 65% 5 65% 5 65% 5 65% 5 65% 5 62% 5 62% 5 62% 5	98% 97% ip sw_2-g 0 81% 0 52% 0 0 97% 0 97% 0 97% 0 97% 0 97% 0 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92%	98% 97% ip sw_2_3- 81% 63% 92% 75% 80% 71% 95%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh	90% 95% t w/ s sw 81% 91% 65% 79% 91% 98%	78% 76% t w/ s 2-g 61% 57% 70% 69% 76% 54% 76%	64% 59% sw_2-g 81% 68% 72% 65% 78% 87% 97%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline \mathbf{t} \ \mathbf{w/s} \\ \mathbf{sw_2_3-} \\ 81\% \\ \hline 60\% \\ \hline 72\% \\ \hline 65\% \\ \hline 65\% \\ \hline 59\% \\ 97\% \end{array}$	98% 97% g sw 81% 66% 80% 75% 81% 75%	59% 76% ip 2-g 5 65% 5 65% 5 65% 5 65% 5 65% 5 65% 5 65% 5 65% 5 62% 5 62% 5 62% 5	98% 97% ip sw_2-g 0 81% 0 52% 0 0 97% 0 97% 0 97% 0 97% 0 97% 0 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92% 92%	98% 97% ip 81% 63% 66% 92% 75% 80% 71%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia	90% 95% t w/ s sw 81% 87% 91% 65% 79% 91% 91% 98% 100%	78% 76% t w/s 2-g 61% 57% 70% 69% 76% 54% 76% 72% 78% 66%	64% 59% sw_2-g 81% 68% 72% 65% 78% 97% 71%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline {\bf t w/s} \\ {\bf sw_2_3-} \\ 81\% \\ \hline 60\% \\ 72\% \\ 65\% \\ \hline 78\% \\ 59\% \\ 97\% \\ 97\% \\ 70\% \end{array}$	98% 97% g sw 81% 60% 66% 80% 75% 81% 75% 81% 75% 85%	59% ip 2-g 5 76% 5 76% 5 76% 5 76% 5 71% 5 71% 5 78% 5 75% 5 78% 5 78% 5 78% 5 82%	98% 97% ip sw_2-g 81% 52% 66% 92% 75% 80% 71% 95% 77% 87%	98% 97% ip sw_2_3- 81% 63% 66% 92% 75% 80% 71% 95% 79% 87%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r)	90% 95% t w/ s sw 81% 87% 91% 65% 79% 91% 98% 100% 99%	78% 76% t w/s 2-g 61% 57% 69% 76% 54% 76% 72% 78%	64% 59% sw_2sg 81% 68% 72% 65% 78% 97% 91%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline {\bf t} \ {\bf w} / \ {\bf s} \\ {\bf sw} _ 2 \ {\bf 3} - {\bf s} \\ 60\% \\ \hline 72\% \\ 65\% \\ 78\% \\ \hline 59\% \\ 97\% \\ 97\% \\ 80\% \end{array}$	98% 97% ip g sw 81% 60% 66% 80% 75% 81% 75% 85% 92%	59% 76% ip 2-g 6 76% 5 80% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 77%	98% 97% ip sw_2-g 81% 52% 66% 92% 75% 80% 71% 95% 77% 87%	98% 97% ip sw_2_3- 81% 63% 92% 75% 80% 71% 95% 79%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat	90% 95% t w/ s sw 81% 87% 91% 65% 79% 91% 98% 99% 99%	78% 76% t w/s 2-g 61% 57% 70% 69% 76% 54% 76% 72% 78% 66%	64% 59% sw_2-g 81% 68% 72% 65% 78% 97% 99% 99%	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline {\bf t} \ {\bf w/s} \\ sw_2 \ {\bf 3}-, \\ 81\% \\ \hline 60\% \\ \hline 72\% \\ 65\% \\ \hline 78\% \\ \hline 59\% \\ 97\% \\ \hline 97\% \\ \hline 80\% \\ 99\% \\ \hline 99\% \end{array}$	98% 97% ip g sw 81% 60% 66% 80% 75% 81% 75% 81% 75% 92% 92%	59% 76% ip 2-g 6 65% 6 65% 6 71% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78%	98% 97% ip sw_2-g a b 52% b c a b c b c b c <	98% 97% ip sw_2_3- 81% 63% 66% 92% 75% 80% 71% 95% 79% 87%
Athraa' Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki	90% 95% t w/ s 81% 87% 91% 65% 79% 91% 98% 100% 99% 99% 79%	78% 76% t w/s 2-g 61% 57% 69% 76% 54% 76% 54% 76% 54% 66% 80%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c} 94\% \\ \hline 59\% \\ \hline t w/s \\ sw_2_3-; \\ 81\% \\ \hline 60\% \\ 72\% \\ 65\% \\ 78\% \\ \hline 59\% \\ 97\% \\ 97\% \\ 70\% \\ 80\% \\ 99\% \\ 78\% \end{array}$	98% 97% ip g sw 81% 60% 80% 75% 81% 75% 81% 75% 81% 92% 92% 90% 90%	59% 76% ip 2-g 6 6 76% 6 76% 6 76% 6 76% 6 75% 6 75% 6 75% 6 75% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 6 78% 78%	98% 97% ip sw_22g 81% 52% 66% 92% 75% 80% 71% 93% 71% 93% 71% 93% 77%	98% 97% ip sw_2_3- 81% 63% 66% 92% 75% 80% 71% 95% 79% 87% 90%
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Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	90% 95% t w/ s 81% 87% 91% 65% 79% 98% 100% 99% 99% 99% 99% 81% 100% 99% 99% 81%	$\begin{array}{c c} 78\% \\ \hline 78\% \\ \hline 76\% \\ \hline 76\% \\ \hline 2 \text{-g} \\ 61\% \\ \hline 57\% \\ \hline 70\% \\ \hline 69\% \\ \hline 76\% \\ \hline 54\% \\ \hline 76\% \\ \hline 76\% \\ \hline 74\% \\ \hline 78\% \\ \hline 66\% \\ \hline 80\% \\ \hline 60\% \\ \hline 71\% \\ \hline 80\% \\ \hline 60\% \\ \hline 71\% \\ \hline 80\% \\ \hline 60\% \\ \hline 77\% \\ \hline 79\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 60\% \\ \hline 77\% \\ \hline 60\% \\ \hline 65\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	98% 97% 97% 97% 81% 66% 81% 66% 80% 75% 85% 92% 90% 80% 75% 85% 92% 90% 80% 75% 80% 75% 80% 75% 80% 80% 74% 83% 94% 84% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip sw_2_3- 81% 63% 92% 75% 80% 71% 95% 79% 87% 90% 85% 77% 88% 99% 85% 99% 88% 99% 86% 95% 90% 88% 99% 95% 93% 84% 94% 82% 53% 62%
Athraa' Qedra Oataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar Azhar	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	98% 98% 97% ip g sw 81% 60% 66% 81% 60% 80% 75% 81% 75% 81% 75% 81% 75% 81% 75% 85% 92% 79% 90% 55% 66% 86% 77% 83% 58% 94% 83% 84% 76% 83% 76% 75%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	98% 97% ip sw_2_3- 81% 63% 92% 75% 80% 71% 95% 79% 87% 90% 85% 77% 86% 99% 73% 86% 99% 73% 86% 99% 53% 94% 82% 84% 53% 62% 75%
Athraa' Qedra Qedra Dataset (Query) Amazon Adnan Ibrahim Amman Jarrar Alishaa' Nahawnd Qersh Asia Shir (Shi3r) Arafat Cameron Maliki Baqara Sakhr Iqteran Aziz Ahram Jalamah Malek Abdullah Jamaa Arabiya Sakakini Bursa Ain Thaheryah Tarablus Azhar	90% 95% t w/ s 81% 87% 91% 65% 79% 98% 100% 99% 99% 99% 99% 81% 100% 99% 99% 81%	$\begin{array}{c c} 78\% \\ \hline 78\% \\ \hline 76\% \\ \hline 76\% \\ \hline 2 \text{-g} \\ 61\% \\ \hline 57\% \\ \hline 70\% \\ \hline 69\% \\ \hline 76\% \\ \hline 54\% \\ \hline 76\% \\ \hline 76\% \\ \hline 74\% \\ \hline 78\% \\ \hline 66\% \\ \hline 80\% \\ \hline 60\% \\ \hline 71\% \\ \hline 80\% \\ \hline 60\% \\ \hline 71\% \\ \hline 80\% \\ \hline 60\% \\ \hline 77\% \\ \hline 79\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 99\% \\ \hline 60\% \\ \hline 77\% \\ \hline 60\% \\ \hline 65\% \\ \hline \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	98% 97% 97% 97% 97% 81% 60% 66% 80% 75% 81% 66% 80% 75% 92% 92% 90% 80% 55% 66% 86% 77% 83% 86% 77% 83% 86% 77% 83% 86% 77% 83% 86% 77% 83% 84% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76% 76%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

C.3.7 Google/Plain

Table C.24: Per level and query macro F-measure when using plain benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	55%	55%	52%	58%	61%	60%	55%	55%
Arafat	70%	70%	67%	50%	76%	52%	61%	61%
Maliki	70%	68%	70%	70%	77%	44%	48%	48%
Sakhr	71%	76%	67%	67%	70%	58%	58%	73%
Jamaa Arabiya	57%	54%	45%	52%	61%	76%	72%	76%
Thaheryah	67%	70%	67%	67%	54%	55%	64%	64%
Tarablus	57%	75%	57%	57%	44%	47%	69%	69%
Arabiyah	76%	68%	72%	68%	82%	42%	82%	82%
Asad	68%	71%	86%	83%	61%	69%	59%	57%
Athraa'	61%	61%	61%	61%	92%	49%	87%	58%
Qedra	67%	70%	72%	72%	90%	49%	72%	72%
	tw/s	tw/s	tw/s		ip		ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-			0		
Amman	76%	49%	76%	76%	56%			49%
Arafat	70%	70%	70%	70%	59%			70%
Maliki	85%	43%	51%	65%	66%			66%
Sakhr	77%	58%	73%	73%	66%			58%
Jamaa Arabiya	63%	75%	77%	77%	349			34%
Thaheryah	48%	71%	73%	73%	86%			51%
Tarablus	52%	47%	52%	52%	58%	6 50%	58%	58%
Arabiyah	76%	71%	76%	76%	56%			51%
Asad	71%	49%	76%	61%	72%			72%
Athraa'	95%	59%	61%	61%	48%			48%
Qedra	61%	56%	61%	67%	619	61%	61%	61%

Table C.25: Per level and query weighted recall when using plain benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	55%	55%	47%	59%	47%	56%	57%	57%
Arafat	74%	74%	51%	44%	74%	50%	58%	58%
Maliki	75%	63%	75%	75%	79%	41%	47%	46%
Sakhr	71%	79%	68%	68%	76%	71%	71%	61%
Jamaa Arabiya	53%	46%	33%	38%	45%	62%	57%	62%
Thaheryah	66%	77%	66%	66%	52%	44%	61%	61%
Tarablus	50%	79%	50%	50%	51%	48%	68%	68%
Arabiyah	76%	61%	63%	57%	72%	57%	72%	72%
Asad	60%	64%	86%	82%	51%	60%	50%	48%
Athraa'	66%	66%	66%	66%	92%	37%	83%	40%
Qedra	67%	66%	71%	71%	82%	44%	63%	63%
	tw/s	tw/s	tw/s	tw/s	ip		ip	ip
Dataset (Query)	\mathbf{sw}	2-g		$s = sw_2_3-s$	g sw		sw2-g	sw_2_3-g
Amman	63%	63%	63%	63%	67%	63%	67%	63%
Arafat	74%	74%	74%	74%	54%		79%	79%
Maliki	89%	36%	47%	56%	75%		75%	75%
Sakhr	79%	71%	76%	76%	689		71%	71%
Jamaa Arabiya	64%	60%	62%	63%	51%		51%	51%
Thaheryah	44%	74%	77%	77%	789		54%	54%
Tarablus	52%	31%	52%	52%	67%		67%	67%
Arabiyah	76%	65%	76%	76%	62%		62%	62%
Asad	65%	39%	72%	52%	66%		66%	66%
Athraa'	92%	65%	66%	66%	589	61%	58%	58%
Athraa	62%	0070	0076	67%	629		62%	62%

Table C.26: Per level and query weighted precision when using plain benchmarks for Google.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g s	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	79%	79%	82%	79%	87%	82%	72%	72%
Arafat	68%	68%	100%	58%	88%	78%	81%	81%
Maliki	65%	80%	65%	65%	80%	53%	74%	76%
Sakhr	79%	72%	71%	71%	74%	50%	50%	92%
Jamaa Arabiya	75%	81%	82%	90%	93%	100%	100%	100%
Thaheryah	73%	83%	73%	73%	85%	74%	70%	70%
Tarablus	68%	84%	68%	68%	39%	57%	85%	85%
Arabiyah	85%	85%	90%	89%	94%	33%	94%	94%
Asad	82%	82%	86%	86%	91%	92%	91%	91%
Athraa'	74%	74%	74%	74%	92%	81%	94%	100%
Qedra	83%	85%	85%	85%	100%	79%	88%	88%
	tw/s	tw/s	tw/s		ip	ip	ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw2-g			2-g	sw_2-g	sw_2_3-g
Amman	100%	40%	100%	100%	78%	40%	67%	40%
Arafat	68%	68%	68%	68%	82%		62%	62%
Maliki	83%	54%	56%	80%	64%		64%	64%
Sakhr	78%	50%	73%	71%	72%	71%	73%	50%
Jamaa Arabiya	81%	100%	100%	100%	26%		26%	26%
Jamaa Arabiya Thaheryah	81% 61%	100% 75%	100% 75%				26% 48%	48%
Thaheryah Tarablus				100% 75% 54%	26%	54% 49%		
Thaheryah Tarablus Arabiyah	61% 54% 85%	75% 100% 85%	75% 54% 85%	100% 75% 54% 85%	26% 96% 62% 63%	54% 49% 86%	48% 62% 63%	48% 62% 77%
Thaheryah Tarablus	61% 54%	75% 100% 85% 80%	75% 54% 85% 80%	$ \begin{array}{r} 100\% \\ 75\% \\ 54\% \\ 85\% \\ 91\% \\ \end{array} $	26% 96% 62% 63% 79%	54% 49% 86% 79%	48% 62% 63% 79%	48% 62% 77% 79%
Thaheryah Tarablus Arabiyah	61% 54% 85%	75% 100% 85%	75% 54% 85%	100% 75% 54% 85%	26% 96% 62% 63%	54% 49% 86% 79%	48% 62% 63%	48% 62% 77%

C.3.8 Bing/Plain

Table C.27: Per level and query macro F-measure when using plain benchmarks for Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	55%	54%	54%	54%	60%	62%	60%	60%
Jarrar	46%	56%	66%	66%	56%	70%	56%	56%
Alishaa'	55%	40%	56%	56%	52%	37%	58%	58%
Arafat	58%	59%	64%	64%	50%	47%	54%	54%
Maliki	72%	51%	72%	72%	61%	55%	61%	61%
Sakhr	71%	42%	69%	67%	63%	38%	31%	31%
Malek Abdullah	56%	54%	56%	53%	50%	51%	57%	56%
Jamaa Arabiya	61%	65%	67%	73%	62%	52%	73%	68%
Bursa	56%	43%	56%	56%	54%	44%	54%	54%
Thaheryah	50%	50%	53%	53%	66%	58%	66%	66%
Tarablus	44%	52%	42%	42%	44%	49%	44%	44%
Arabiyah	79%	84%	81%	81%	57%	62%	63%	59%
Asad	57%	41%	68%	68%	85%	38%	71%	42%
Athraa'	41%	54%	54%	54%	94%	51%	54%	54%
Qedra	71%	73%	60%	60%	65%	52%	65%	65%
	tw/s	tw/s	tw/s		ip	ip	ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-g					
Amman	64%	60%	66%	66%	54%			54%
Jarrar	72%	62%	68%	68%	64%			48%
Alishaa'	58%	39%	57%	57%	70%			64%
Arafat	92%	45%	51%	51%	83%			83%
Maliki	84%	52%	84%	84%	62%	0 0070		64%
Sakhr	73%	38%	85%	73%	44%			36%
Malek Abdullah	54%	55%	65%	62%	58%			59%
Jamaa Arabiya	62%	67%	73%	60%	83%			93%
Bursa	46%	40%	46%	46%	74%			75%
Thaheryah	53%	43%	53%	53%	919			76%
Tarablus	58%	43%	58%	58%	50%			50%
Arabiyah	87%	67%	81%	81%	75%			71%
Asad	72%	42%	74%	74%	60%			60%
Athraa'	100%	47%	100%	100%	74%			84%
Qedra	73%	70%	67%	67%	829	% 52%	69%	69%

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	45%	61%	43%	43%	49%	64%	49%	49%
Jarrar	31%	43%	55%	55%	43%	61%	43%	43%
Alishaa'	45%	44%	41%	41%	38%	37%	46%	46%
Arafat	41%	59%	64%	64%	34%	42%	47%	47%
Maliki	65%	61%	65%	65%	51%	56%	51%	51%
Sakhr	70%	50%	71%	69%	61%	50%	43%	43%
Malek Abdullah		38%	43%	41%	46%	34%	42%	41%
Jamaa Arabiya	48%	49%	51%	59%	45%	42%	59%	53%
Bursa	49%	52%	49%	49%	38%	43%	38%	38%
Thaheryah	40%	50%	60%	60%	58%	54%	58%	58%
Tarablus	32%	52%	34%	34%	32%	44%	32%	32%
Arabiyah	66%	81%	69%	69%	43%	67%	48%	45%
Asad	43%	45%	57%	57%	84%	35%	78%	51%
Athraa'	28%	60%	37%	37%	94%	52%	37%	37%
Qedra	56%	70%	48%	48%	48%	62%	48%	48%
	tw/s	tw/s	tw/s		ip		ip	ip
Dataset (Query)	sw	2-g	sw_2-§					
Amman	47%	61%	49%	49%	56%			67%
Jarrar	65%	48%	58%	58%	61%			47%
Alishaa'	41%	40%	40%	40%	71%			66%
Arafat	90%	34%	35%	35%	83%			83%
Maliki	77%	52%	77%	77%	67%			70%
Sakhr	70%	50%	83%	67%	46%			39%
Malek Abdullah	51%	39%	51%	48%	579			57%
Jamaa Arabiya	45%	51%	58%	43%	83%			93%
Bursa	32%	37%	32%	32%	76%			77%
Thaheryah	52%	50%	52%	52%	91%			64%
Tarablus	42%	38%	42%	42%	51%			51%
Arabiyah	80%	58%	72%	72%	79%			76%
Asad	58%	35%	82%	82%	66%			66%
Athraa'	100%	44%	100%	100%	74%	% 59%		85%
Qedra	57%	73%	50%	50%	80%	6 57%	57%	57%

Table C.28: Per level and query weighted recall when using plain benchmarks for Bing.

Table C.29: Per level and query weighted precision when using plain benchmarks for Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	85%	62%	85%	85%	87%	81%	87%	87%
Jarrar	100%	83%	100%	100%	100%	87%	100%	100%
Alishaa'	82%	76%	88%	88%	87%	76%	85%	85%
Arafat	100%	80%	82%	82%	100%	78%	85%	85%
Maliki	92%	77%	92%	92%	86%	79%	86%	86%
Sakhr	88%	59%	87%	86%	85%	50%	55%	55%
Malek Abdullah	60%	91%	87%	89%	63%	100%	89%	93%
Jamaa Arabiya	85%	98%	98%	99%	100%	78%	100%	100%
Bursa	85%	76%	85%	85%	100%	77%	100%	100%
Thaheryah	81%	78%	79%	79%	86%	80%	86%	86%
Tarablus	81%	79%	57%	57%	85%	79%	85%	85%
Arabiyah	100%	91%	100%	100%	91%	58%	93%	90%
Asad	92%	78%	91%	91%	92%	79%	68%	59%
Athraa'	84%	79%	100%	100%	95%	79%	100%	100%
Qedra	100%	84%	83%	83%	100%	77%	100%	100%
	tw/s	tw/s			ip	ip	ip	ip
Dataset (Query)	sw	2-g		g sw_2_3-	g sw	2-g	sw_2-g	sw_2_3-g
Amman	sw 100%	2-g 80%	sw_2- 100%	g sw_2_3- 100%	• g sw 53%	2-g 45%	sw_2-g 62%	sw_2_3-g 45%
Amman Jarrar	sw 100% 100%	2-g 80% 86%	sw_2- 100% 100%	g sw_2_3- 100% 100%	•g sw 53% 68%	2-g 45% 58%	sw_2-g 62% 50%	sw_2_3-g 45% 50%
Amman Jarrar Alishaa'	sw 100% 100% 100%	2-g 80% 86% 78%	sw_2- 100% 100% 100%	g sw_2_3- 100% 100% 100%	•g sw 53% 68% 82%	2-g 45% 58% 81%	sw_2-g 62% 50% 81%	sw_2_3-g 45% 50% 80%
Amman Jarrar	sw 100% 100% 100% 95%	2-g 80% 86% 78% 79%	sw_2- 100% 100% 100% 100%	g sw_2_3- 100% 100% 100% 100%	g sw 53% 68% 82% 87%	2-g 45% 58% 81% 83%	sw_2-g 62% 50% 81% 87%	sw_2_3-g 45% 50% 80% 87%
Amman Jarrar Alishaa' Arafat Maliki	sw 100% 100% 100% 95% 98%	2-g 80% 86% 78% 79% 79%	sw_2- 100% 100% 100% 100% 98%	g sw_2_3- 100% 100% 100% 100% 98%	g sw 53% 68% 82% 87% 60%	2-g 45% 58% 81% 83% 66%	sw_2-g 62% 50% 81% 87% 62%	sw_2_3-g 45% 50% 80% 87% 65%
Amman Jarrar Alishaa' Arafat Maliki Sakhr	sw 100% 100% 95% 98% 90%	2-g 80% 86% 78% 79% 79% 50%	sw_2- 100% 100% 100% 98% 96%	g sw_2_3- 100% 100% 100% 100% 98% 91%	g sw 53% 68% 82% 87% 60% 61%	2-g 45% 58% 81% 83% 66% 43%	sw_2-g 62% 50% 81% 87% 62% 47%	sw_2_3-g 45% 50% 80% 87% 65% 51%
Amman Jarrar Alishaa' Arafat Maliki	sw 100% 100% 100% 95% 98%	2-g 80% 86% 78% 79% 79%	sw_2- 100% 100% 100% 100% 98%	g sw_2_3- 100% 100% 100% 100% 98%	g sw 53% 68% 82% 87% 60% 61% 59%	2-g 45% 58% 81% 66% 43% 56%	sw_2-g 62% 50% 81% 87% 62%	sw_2_3-g 45% 50% 80% 87% 65% 51% 85%
Amman Jarrar Alishaa' Arafat Maliki Sakhr	sw 100% 100% 95% 98% 90% 69% 100%	2-g 80% 86% 78% 79% 79% 50% 97% 100%	sw_2- 100% 100% 100% 98% 96% 92% 100%	g sw_2_3- 100% 100% 100% 98% 91% 89% 100%	g sw 53% 68% 82% 87% 60% 61% 59% 84%	2-g 45% 58% 81% 666% 43% 56% 89%	sw_2-g 62% 50% 81% 62% 47% 84% 92%	sw_2_3-g 45% 50% 80% 87% 65% 51% 85% 94%
Amman Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa	$\begin{array}{c} \mathbf{sw} \\ 100\% \\ 100\% \\ 95\% \\ 98\% \\ 90\% \\ 69\% \\ 100\% \\ 85\% \end{array}$	2-g 80% 86% 78% 79% 50% 97% 100% 77%	sw_2- 100% 100% 100% 98% 96% 92% 100% 85%	g sw_2_3- 100% 100% 100% 98% 91% 89% 100% 85%	g sw 53% 68% 82% 87% 60% 61% 59% 84% 83%	2-g 45% 58% 81% 66% 66% 43% 56% 89% 76%	sw_2-g 62% 50% 81% 87% 62% 47% 84% 92% 83%	sw_2_3-g 45% 50% 80% 87% 65% 51% 85% 94% 84%
Amman Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah	sw 100% 100% 95% 98% 90% 69% 100% 85% 80%	2-g 80% 86% 78% 79% 50% 97% 100% 77% 78%	sw_2- 100% 100% 100% 98% 96% 92% 100% 85% 80%	g sw_2_3- 100% 100% 100% 100% 98% 91% 89% 100% 85% 80%	g sw 53% 68% 82% 87% 60% 61% 59% 84% 83% 93%	2-g 45% 58% 81% 66% 66% 56% 56% 89% 56% 55%	sw_2-g 62% 50% 81% 87% 62% 47% 84% 92% 83% 90%	sw_2_3-g 45% 50% 80% 87% 65% 94% 84% 94%
Amman Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus	sw 100% 100% 95% 98% 90% 69% 100% 85% 80% 100%	2-g 80% 86% 78% 79% 50% 97% 100% 77% 78% 77%	sw_2- 100% 100% 100% 98% 96% 92% 100% 85% 80% 100%	g sw_2_3- 100% 100% 100% 98% 91% 89% 100% 85% 80% 100%	g sw 53% 68% 82% 87% 60% 61% 59% 84% 83% 93% 50%	2-g 45% 58% 81% 66% 66% 56% 56% 89% 76% 555% 44%	sw_2-g 62% 50% 50% 81% 87% 62% 47% 84% 92% 83% 90% 50% 50%	sw_2_3-g 45% 50% 80% 87% 65% 51% 85% 94% 94% 50%
Amman Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus Arabiyah	sw 100% 100% 95% 98% 90% 69% 100% 85% 80% 100% 97%	2-g 80% 86% 78% 79% 50% 97% 100% 77% 78% 77% 86%	sw_2- 100% 100% 100% 98% 92% 100% 85% 80% 100% 92%	g sw_2_3- 100% 100% 100% 98% 91% 89% 100% 85% 80% 100% 97%	g sw 53% 68% 82% 87% 60% 61% 59% 84% 83% 93% 50% 75%	2-g 45% 58% 81% 83% 66% 43% 56% 89% 76% 55% 44% 54%	sw_2-g 62% 50% 81% 87% 62% 47% 84% 92% 83% 90% 50% 70%	sw_2_3-g 45% 50% 80% 87% 65% 51% 85% 94% 84% 94% 50% 70%
Amman Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus Arabiyah Asad	$\begin{array}{c} \mathbf{sw} \\ \mathbf{100\%} \\ 100\% \\ 100\% \\ 95\% \\ 98\% \\ 90\% \\ 69\% \\ 100\% \\ 85\% \\ 80\% \\ 100\% \\ 97\% \\ 96\% \end{array}$	2-g 80% 78% 79% 50% 97% 100% 77% 78% 77% 78% 77% 866% 81%	sw_2- 100% 100% 100% 98% 92% 100% 85% 80% 100% 97% 69%	g sw_2_3- 100% 100% 100% 100% 98% 91% 89% 100% 85% 80% 100% 69%	g sw 53% 53% 68% 82% 87% 60% 61% 59% 84% 83% 93% 50% 75% 63%	2-g 45% 58% 81% 83% 66% 43% 56% 56% 55% 55% 44% 54% 60%	sw_2-g 62% 60% 50% 81% 87% 62% 47% 84% 92% 90% 50% 50% 63%	$\begin{array}{r} \mathbf{sw_2_3-g} \\ 45\% \\ 50\% \\ 80\% \\ 87\% \\ 65\% \\ 51\% \\ 85\% \\ 94\% \\ 94\% \\ 50\% \\ 70\% \\ 63\% \end{array}$
Amman Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus Arabiyah	sw 100% 100% 95% 98% 90% 69% 100% 85% 80% 100% 97%	2-g 80% 86% 78% 79% 50% 97% 100% 77% 78% 77% 86%	sw_2- 100% 100% 100% 98% 92% 100% 85% 80% 100% 92%	g sw_2_3- 100% 100% 100% 98% 91% 89% 100% 85% 80% 100% 97%	g sw 53% 68% 82% 87% 60% 61% 59% 84% 83% 93% 50% 75%	2-g 45% 58% 58% 681% 58% 666% 43% 56% 56% 56% 55% 44% 54% 60% 78%	sw_2-g 62% 50% 50% 81% 87% 62% 47% 84% 92% 83% 90% 50% 70%	sw_2_3-g 45% 50% 80% 87% 65% 51% 85% 94% 84% 94% 50% 70%

C.3.9 Google/Supervised Clustering/Human-annotated

Table C.30: Per level and query macro F-measure when using MBHA supervised approach/Google.

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	62%	49%	20%	54%	36%	49%	36%	36%
Arafat	70%	70%	18%	21%	72%	91%	68%	89%
Maliki	81%	6%	19%	19%	89%	71%	92%	73%
Sakhr	76%	17%	61%	76%	17%	1%	10%	13%
Jamaa Arabiya	53%	53%	53%	53%	59%	42%	90%	82%
Thaheryah	43%	11%	34%	78%	71%	70%	85%	81%
Tarablus	50%	17%	50%	50%	85%	23%	79%	50%
Arabiyah	91%	42%	42%	42%	35%	35%	35%	35%
Asad	95%	91%	91%	91%	1%	85%	87%	72%
Athraa'	61%	35%	35%	35%	84%	32%	89%	85%
Qedra	30%	17%	30%	30%	77%	53%	77%	77%
	tw/s	tw/s	tw/s		ip		ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-§			0		sw_2_3-g
Amman	77%	60%	86%	52%	20%			20%
Arafat	100%	91%	95%	95%	749			76%
Maliki	97%	44%	63%	92%	61%			76%
Sakhr	19%	80%	74%	80%	15%			22%
Jamaa Arabiya	83%	77%	89%	90%	61%			64%
Thaheryah	100%	11%	88%	88%	63%	68%	90%	90%
Tarablus	64%	17%	61%	64%	60%	6 52%	60%	60%
Arabiyah	50%	35%	44%	37%	33%	6 35%	35%	33%
Asad	94%	75%	97%	95%	97%	6 91%	71%	91%
Athraa'	61%	61%	90%	88%	98%	6 77%	75%	69%
Qedra	81%	15%	49%	49%	81%	63%	76%	76%

Table C.31: Per level and query weighted recall when using MBHA supervised approach/Google.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	70%	63%	37%	63%	43%	63%	43%	43%
Arafat	79%	79%	26%	26%	76%	92%	76%	89%
Maliki	82%	19%	25%	25%	89%	75%	93%	68%
Sakhr	79%	26%	65%	76%	21%	9%	14%	17%
Jamaa Arabiya	58%	58%	58%	58%	64%	55%	91%	83%
Thaheryah	45%	26%	39%	81%	74%	77%	87%	84%
Tarablus	48%	33%	48%	48%	85%	36%	79%	61%
Arabiyah	90%	57%	57%	57%	48%	48%	48%	48%
Asad	96%	93%	93%	93%	7%	84%	91%	63%
Athraa'	66%	48%	48%	48%	84%	47%	89%	85%
Qedra	29%	33%	29%	29%	76%	67%	76%	76%
	tw/s	tw/s	tw/s	tw/s	ip	ip	ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-g			2-g		
Amman	77%	67%	87%	53%	37%		37%	37%
Arafat	100%	92%	95%	95%	71%		74%	74%
Maliki	96%	45%	57%	93%	54%	18%	82%	79%
Sakhr	25%	82%	74%	82%	26%	68%	24%	24%
Sakhr Jamaa Arabiya	83%	82% 77%	74% 89%	82% 91%	26% 66%	68% 68%	24% 66%	24% 68%
Jamaa Arabiya Thaheryah	83% 100%	82% 77% 26%	74% 89% 87%	82% 91% 87%	26% 66% 74%	68% 68% 74%	24% 66% 90%	24% 68% 90%
Jamaa Arabiya	83% 100% 64%	82% 77% 26% 33%	74% 89% 87% 61%	82% 91% 87% 64%	26% 66% 74% 70%	68% 68% 74% 52%	24% 66% 90% 70%	24% 68% 90% 70%
Jamaa Arabiya Thaheryah	83% 100%	82% 77% 26% 33% 48%	74% 89% 87% 61% 48%	$ \begin{array}{r} $	26% 66% 74% 70% 43%	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	24% 66% 90% 70% 48%	24% 68% 90% 70% 43%
Jamaa Arabiya Thaheryah Tarablus Arabiyah Asad	$\frac{83\%}{100\%}$ $\frac{64\%}{52\%}$ 93%	82% 77% 26% 33% 48% 63%	$ \begin{array}{r} 74\% \\ 89\% \\ 87\% \\ 61\% \\ 48\% \\ 98\% \\ \end{array} $	$ \begin{array}{r} $	26% 66% 74% 70% 43% 98%	$\begin{array}{c c} 68\% \\ 68\% \\ 68\% \\ 74\% \\ 52\% \\ 48\% \\ 93\% \\ \end{array}$	$ \begin{array}{r} 24\% \\ 66\% \\ 90\% \\ 70\% \\ 48\% \\ 63\% \\ 63\% \\ \hline $	$\begin{array}{r} 24\% \\ 68\% \\ 90\% \\ \hline 70\% \\ 43\% \\ 89\% \\ \end{array}$
Jamaa Arabiya Thaheryah Tarablus Arabiyah	83% 100% 64% 52%	82% 77% 26% 33% 48%	74% 89% 87% 61% 48%	$ \begin{array}{r} $	26% 66% 74% 70% 43%	$\begin{array}{c cccc} & 68\% \\ & 68\% \\ & 74\% \\ & 52\% \\ & 48\% \\ & 93\% \\ & 77\% \end{array}$	24% 66% 90% 70% 48%	24% 68% 90% 70% 43%

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	80%	40%	13%	59%	62%	40%	62%	62%
Arafat	62%	62%	84%	64%	70%	93%	62%	89%
Maliki	81%	3%	75%	75%	90%	74%	95%	83%
Sakhr	72%	15%	58%	78%	22%	1%	19%	19%
Jamaa Arabiya		65%	65%	65%	79%	76%	92%	87%
Thaheryah	82%	7%	82%	80%	71%	83%	89%	87%
Tarablus	52%	11%	52%	52%	90%	78%	87%	43%
Arabiyah	92%	33%	33%	33%	76%	76%	76%	76%
Asad	95%	92%	92%	92%	0%	86%	83%	94%
Athraa'	74%	76%	76%	76%	88%	76%	91%	89%
Qedra	31%	11%	31%	31%	86%	44%	86%	86%
	tw/s	1 1 .	1 1 /	4 1 1	1	•		•
	ιw/s	tw/s	s tw/s		ip			ip
Dataset (Query)	sw	2-g	s tw/s sw_2-	g sw_2_3-		-	sw_2-g	
Dataset (Query) Amman	sw 82%	2-g 67%		g sw_2_3- 65%	g sw 139	2-g	sw_2-g	g sw_2_3-g 13%
(• • • • • • • • • • • • • • • • • • •	sw 82% 100%	2-g 67% 93%	sw_2-1 89% 96%	g sw_2_3- 65% 96%	g sw 13% 88%	2-g 6 409 6 859	sw_2-g 6 13% 6 85%	g sw_2_3-g 13% 85%
Amman Arafat Maliki	sw 82% 100% 97%	2-g 67% 93% 72%	sw_2-1 89% 96% 77%	g sw_2_3- 65% 96% 95%	g sw 139 889 919	2-g % 40% % 85% % 73%	sw_2-g 6 13% 6 85% 6 86%	g sw_2_3-g 13% 85% 80%
Amman Arafat	sw 82% 100%	2-g 67% 93%	sw_2-1 89% 96%	g sw_2_3- 65% 96%	g sw 13% 88%	2-g % 40% % 85% % 73%	sw_2-g 6 13% 6 85% 6 86%	g sw_2_3-g 13% 85%
Amman Arafat Maliki	sw 82% 100% 97% 19% 85%	2-g 67% 93% 72% 79% 79%	sw_2-; 89% 96% 77% 80% 91%	g sw_2_3-; 65% 96% 95% 77% 92%	g sw 139 889 919 119 809	2-g 6 40% 6 85% 6 73% 6 83% 6 80%	sw_2-g 33% 35% 36% 36% 36% 36% 36% 36% 36% 36	sw_2_3-g 13% 85% 80% 92% 80%
Amman Arafat Maliki Sakhr	sw 82% 100% 97% 19%	2-g 67% 93% 72% 79%	sw_2-; 89% 96% 77% 80%	g sw_2_3- 65% 96% 95% 77%	g sw 139 889 919 119	2-g 6 40% 6 85% 6 73% 6 83% 6 80%	sw_2-g 33% 35% 36% 36% 36% 36% 36% 36% 36% 36	g sw_2_3-g 13% 85% 80% 92%
Amman Arafat Maliki Sakhr Jamaa Arabiya	sw 82% 100% 97% 19% 85%	2-g 67% 93% 72% 79% 79% 79% 79% 11%	sw_2-1 89% 96% 77% 80% 91% 91% 76%	g sw_2_3- 65% 96% 95% 77% 92% 91% 73%	g sw 139 889 919 119 809 559 799	2-g 6 40% 73% 85% 73% 83% 6 83% 6 83% 76 69% 76 52%	sw_2-g 5 sw_2-g 6 13% 6 85% 6 86% 6 92% 6 80% 6 91% 6 79%	sw_2_3-g 13% 85% 80% 92% 80% 91% 79%
Amman Arafat Maliki Sakhr Jamaa Arabiya Thaheryah	sw 82% 100% 97% 19% 85% 100% 73% 58%	2-g 67% 93% 72% 79% 79% 7% 11% 76%	sw_2-1 89% 96% 77% 80% 91% 91% 53%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	g sw 139 889 919 119 809 559 799 479	2-g 6 409 6 859 6 739 6 839 6 809 6 699 6 529 6 769	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	sw_2_3-g 13% 85% 80% 92% 80% 91% 79% 47%
Amman Arafat Maliki Sakhr Jamaa Arabiya Thaheryah Tarablus Arabiyah Asad	$\begin{array}{c} \mathbf{sw} \\ 82\% \\ 100\% \\ 97\% \\ 19\% \\ 85\% \\ 100\% \\ 73\% \\ 58\% \\ 99\% \end{array}$	2-g 67% 93% 72% 79% 79% 7% 11% 76% 98%	sw_2-1 89% 96% 77% 80% 91% 76% 53% 97%	g sw_2_3-; 65% 96% 95% 77% 92% 91% 73% 46% 99%	g sw 139 889 919 119 809 559 799 479 979	2-g 6 409 6 859 6 839 6 809 6 609 6 529 6 769 6 929	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	sw_2_3-g 13% 85% 80% 92% 80% 91% 79% 47% 92%
Amman Arafat Maliki Sakhr Jamaa Arabiya Thaheryah Tarablus Arabiyah	sw 82% 100% 97% 19% 85% 100% 73% 58%	2-g 67% 93% 72% 79% 79% 7% 11% 76%	sw_2-1 89% 96% 77% 80% 91% 91% 53%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	g sw 139 889 919 119 809 559 799 479	2-g 6 40% 6 85% 6 83% 6 83% 6 80% 6 52% 6 76% 6 92% 6 79%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	sw_2_3-g 13% 85% 80% 92% 80% 91% 79% 47%

Table C.32: Per level and query weighted precision when using MBHA supervised approach/Google.

C.3.10 Bing/Supervised Clustering/Human-annotated

Table C.33: Per level and query macro F-measure when using MBHA supervised approach/Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	72%	19%	77%	77%	31%	57%	86%	81%
Jarrar	85%	29%	29%	29%	90%	22%	37%	37%
Alishaa'	76%	44%	74%	74%	47%	25%	45%	45%
Arafat	83%	60%	85%	78%	73%	56%	79%	79%
Maliki	28%	21%	49%	49%	79%	44%	70%	70%
Sakhr	29%	34%	35%	35%	54%	27%	52%	34%
Malek Abdullah		54%	40%	38%	96%	65%	69%	63%
Jamaa Arabiya	73%	49%	55%	51%	75%	66%	34%	96%
Bursa	38%	38%	38%	36%	72%	47%	60%	56%
Thaheryah	76%	23%	74%	74%	68%	57%	57%	57%
Tarablus	82%	19%	80%	71%	71%	20%	72%	73%
Arabiyah	86%	17%	86%	74%	81%	77%	81%	81%
Asad	35%	37%	71%	71%	41%	44%	40%	83%
Athraa'	97%	37%	95%	95%	93%	37%	95%	95%
Qedra	91%	54%	89%	91%	22%	49%	69%	69%
	tw/s	tw/s			ip	ip	ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-§					
Amman	98%	54%	94%	98%	57%			56%
Jarrar	73%	20%	73%	73%	23%			35%
Alishaa'	40%	44%	77%	77%	59%			72%
Arafat	95%	52%	95%	95%	84%			85%
Maliki	66%	8%	94%	94%	29%			27%
Sakhr	84%	27%	74%	74%	53%			53%
Malek Abdullah	72%	63%	71%	64%	29%			70%
Jamaa Arabiya	80%	67%	77%	77%	55%	-		54%
Bursa	74%	47%	59%	56%	78%			80%
Thaheryah	74%	57%	57%	57%	74%			82%
Tarablus	95%	20%	99%	99%	62%			61%
Arabiyah	87%	21%	84%	84%	8%			60%
Asad	97%	37%	65%	65%	38%			46%
Athraa'	100%	53%	100%	100%	80%			93%
Qedra	89%	72%	84%	84%	49%	56%	49%	49%

Table C.34: Per level and query weighted recall when using MBHA supervised approach/Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	72%	34%	77%	77%	41%	69%	86%	83%
Jarrar	88%	33%	33%	33%	91%	29%	39%	39%
Alishaa'	76%	59%	76%	76%	52%	39%	59%	59%
Arafat	83%	69%	85%	78%	77%	67%	81%	81%
Maliki	28%	36%	48%	48%	81%	57%	75%	75%
Sakhr	41%	44%	44%	44%	59%	43%	57%	46%
Malek Abdullah		53%	42%	40%	96%	63%	66%	61%
Jamaa Arabiya		57%	61%	55%	76%	69%	48%	96%
Bursa	53%	53%	53%	53%	74%	58%	66%	63%
Thaheryah	77%	40%	74%	74%	72%	66%	66%	66%
Tarablus	83%	34%	81%	70%	70%	35%	71%	73%
Arabiyah	88%	26%	88%	81%	83%	81%	83%	83%
Asad	47%	48%	72%	72%	54%	52%	51%	83%
Athraa'	97%	52%	95%	95%	93%	51%	95%	95%
Qedra	91%	65%	89%	91%	35%	63%	74%	74%
	tw/s	tw/s	tw/s		ip		ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-g					
Amman	98%	67%	94%	98%	63%			61%
Jarrar	80%	28%	80%	80%	30%			38%
Alishaa'	49%	59%	79%	79%	67%			72%
Arafat	95%	65%	95%	95%	84%			85%
Maliki	72%	13%	94%	94%	28%			27%
Sakhr	85%	43%	77%	77%	61%			61%
Malek Abdullah	70%	61%	69%	62%	34%			67%
Jamaa Arabiya	81%	70%	78%	78%	61%			60%
Bursa	76%	58%	65%	63%	79%			81%
Thaheryah	77%	66%	66%	66%	77%			83%
Tarablus	95%	35%	99%	99%	68%			66%
Arabiyah	88%	29%	86%	86%	21%			57%
Asad	97%	48%	66%	66%	51%			54%
Athraa'	100%	60%	100%	100%	819			93%
Qedra	89%	76%	85%	85%	63%	59%	63%	63%

Table C.35: Per level and query weighted precision when using MBHA supervised approach/Bing.

	t	t	t	t	s	s	s	s
Dataset (Query		2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	85%	78%	86%	86%	79%	79%	90%	86%
Jarrar	89%	84%	84%	84%	92%	83%	84%	84%
Alishaa'	82%	35%	79%	79%	70%	36%	49%	49%
Arafat	87%	79%	88%	85%	83%	78%	84%	84%
Maliki	64%	40%	73%	73%	83%	66%	72%	72%
Sakhr	45%	55%	68%	68%	80%	53%	79%	53%
Malek Abdullah		84%	83%	83%	96%	86%	86%	85%
Jamaa Arabiya		78%	79%	61%	83%	81%	62%	96%
Bursa	75%	75%	75%	28%	83%	77%	79%	78%
Thaheryah	85%	16%	84%	84%	81%	78%	78%	78%
Tarablus	84%	44%	80%	82%	82%	78%	82%	83%
Arabiyah	90%	83%	90%	85%	82%	79%	82%	82%
Asad	54%	64%	83%	83%	36%	78%	76%	86%
Athraa'	97%	75%	96%	96%	94%	76%	96%	96%
Qedra	91%	78%	89%	92%	34%	40%	82%	82%
	tw/s	tw/s	tw/s		ip		ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-g					
Amman	99%	45%	94%	99%	56%			55%
Jarrar	84%	83%	84%	84%	839			84%
Alishaa'	77%	35%	84%	84%	79%			81%
Arafat	95%	43%	95%	95%	89%			89%
Maliki	81%	64%	94%	94%	55%			55%
Sakhr	89%	53%	85%	85%	57%			57%
Malek Abdullah	87%	85%	87%	85%	76%			86%
Jamaa Arabiya	86%	82%	85%	85%	79%			79%
Bursa	83%	77%	79%	78%	84%			86%
Thaheryah	83%	78%	78%	78%	839			87%
Tarablus	95%	78%	99%	99%	65%	-		62%
Arabiyah	88%	84%	85%	85%	5%			86%
Asad	97%	54%	74%	74%	33%			61%
Athraa'	100%	78%	100%	100%	85%			94%
Qedra	91%	83%	88%	88%	40%	55%	40%	40%

C.3.11 Google/Supervised Clustering/BRF

Table C.36: Per level and query macro F-measure when using BRF supervised approach/Google.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	54%	62%	73%	54%	18%	49%	83%	83%
Arafat	75%	75%	75%	75%	84%	80%	91%	91%
Maliki	40%	60%	15%	9%	43%	35%	65%	65%
Sakhr	11%	61%	2%	61%	11%	70%	12%	12%
Jamaa Arabiya	53%	46%	53%	53%	58%	85%	90%	89%
Thaheryah	73%	63%	73%	73%	69%	17%	82%	82%
Tarablus	53%	53%	53%	53%	49%	50%	50%	50%
Arabiyah	42%	42%	60%	42%	42%	44%	44%	44%
Asad	13%	1%	89%	89%	89%	87%	87%	86%
Athraa'	61%	61%	61%	52%	90%	42%	94%	94%
Qedra	17%	17%	55%	57%	60%	53%	60%	60%
	tw/s	tw/s	tw/s	tw/s	ip	ip	ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-	g sw_2_3-	g sw	2-g	sw_2-g	sw_2_3-g
Amman	86%	48%	54%	54%	20%	6 49%	48%	36%
Arafat	100%	70%	94%	95%	75%		7%	7%
Maliki	75%	50%	75%	75%	64%	6 2%	58%	76%
Sakhr	75%	11%	78%	17%	74%	67%	2%	17%
Jamaa Arabiya	48%	90%	53%	53%	67%		61%	64%
Thaheryah	97%	63%	97%	97%	63%	63%	97%	70%
Tarablus	54%	50%	50%	53%	59%	6 52%	48%	53%
Arabiyah	48%	56%	60%	60%	60%		67%	67%
Asad	86%	86%	86%	96%	7%	91%	2%	2%
Athraa'	61%	59%	61%	61%	62%	69%	70%	69%
Qedra	60%	72%	86%	86%	84%	6 53%	84%	84%

	t	t	t	t	s	s	s	s
Dataset (Query) sw	2-g	sw_2-g	sw_2_3-g	\mathbf{sw}	2-g	sw_2-g	sw_2_3-g
Amman	63%	70%	77%	63%	33%	63%	83%	83%
Arafat	82%	82%	82%	82%	87%	84%	92%	92%
Maliki	39%	71%	18%	14%	43%	36%	61%	61%
Sakhr	15%	62%	6%	65%	15%	76%	17%	17%
Jamaa Arabiya	58%	57%	58%	58%	62%	85%	91%	89%
Thaheryah	77%	74%	77%	77%	71%	29%	81%	81%
Tarablus	52%	67%	67%	67%	58%	61%	61%	61%
Arabiyah	57%	57%	67%	57%	57%	52%	52%	52%
Asad	12%	7%	88%	88%	93%	91%	89%	88%
Athraa'	66%	66%	66%	61%	90%	56%	94%	94%
Qedra	33%	33%	57%	57%	67%	67%	67%	67%
	tw/s	tw/s	tw/s	tw/s	ip	ip	ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-g	g sw_2_3-g	g sw	0	sw_2-g	sw_2_3-g
Amman	87%	60%	63%	63%	37%	63%	47%	37%
		0070	0070	0370	0.7			5170
Arafat	100%	79%	95%	95%	82%	82%	18%	18%
Maliki	71%	$\frac{79\%}{46\%}$	95% 71%	95% 71%	82%	82%	18% 50%	18% 71%
		79%	95%	95%	82%	82%	18% 50%	18%
Maliki	71% 71% 57%	79% 46% 15% 91%	95% 71% 76% 58%	95% 71% 25% 58%	82% 57% 68% 70%	82% 11% 65% 57%	$ 18\% \\ 50\% \\ 10\% \\ 66\% $	$ \begin{array}{r} 18\% \\ 71\% \\ 21\% \\ 68\% \\ \end{array} $
Maliki Sakhr	71% 71%	79% 46% 15%	95% 71% 76% 58% 97%	95% 71% 25%	82% 57% 68%	82% 11% 65% 57%	$ 18\% \\ 50\% \\ 10\% \\ 66\% $	18% 71% 21%
Maliki Sakhr Jamaa Arabiya	71% 71% 57%	79% 46% 15% 91%	95% 71% 76% 58%	95% 71% 25% 58%	82% 57% 68% 70%	82% 11% 65% 57% 74%	$ 18\% \\ 50\% \\ 10\% \\ 666\% \\ 97\% $	$ \begin{array}{r} 18\% \\ 71\% \\ 21\% \\ 68\% \\ \end{array} $
Maliki Sakhr Jamaa Arabiya Thaheryah	71% 71% 57% 97% 61% 57%	$79\% \\ 46\% \\ 15\% \\ 91\% \\ 74\% \\ 61\% \\ 62\% \\$	95% 71% 76% 58% 97% 61% 67%	$ \begin{array}{r} 95\% \\ \hline 71\% \\ 25\% \\ \hline 58\% \\ 97\% \\ \hline 52\% \\ \hline 67\% \\ \end{array} $	82% 57% 68% 70% 74% 64% 67%	$\begin{array}{c c} 82\% \\ 11\% \\ 65\% \\ 57\% \\ 74\% \\ 64\% \\ 48\% \end{array}$	$ 18\% \\ 50\% \\ 10\% \\ 66\% \\ 97\% \\ 52\% \\ 71\% $	18% 71% 21% 68% 77% 67% 71%
Maliki Sakhr Jamaa Arabiya Thaheryah Tarablus	71% 71% 57% 97% 61%	$79\% \\ 46\% \\ 15\% \\ 91\% \\ 74\% \\ 61\% \\ 62\% \\ 86\%$	$\begin{array}{c c} 95\% \\ \hline 71\% \\ 76\% \\ \hline 58\% \\ 97\% \\ \hline 61\% \end{array}$	$ \begin{array}{r} 95\% \\ 71\% \\ 25\% \\ 58\% \\ 97\% \\ 52\% \\ 52\% \\ $	82% 57% 68% 70% 74% 64% 67% 9%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 18\% \\ \hline 50\% \\ \hline 10\% \\ \hline 66\% \\ 97\% \\ \hline 52\% \\ \hline 71\% \\ 9\% \end{array}$	$\begin{array}{c c} 18\% \\ \hline 71\% \\ 21\% \\ 68\% \\ \hline 77\% \\ 67\% \\ \hline 71\% \\ 9\% \end{array}$
Maliki Sakhr Jamaa Arabiya Thaheryah Tarablus Arabiyah	71% 71% 57% 97% 61% 57%	$79\% \\ 46\% \\ 15\% \\ 91\% \\ 74\% \\ 61\% \\ 62\% \\$	95% 71% 76% 58% 97% 61% 67%	$ \begin{array}{r} 95\% \\ \hline 71\% \\ 25\% \\ \hline 58\% \\ 97\% \\ \hline 52\% \\ \hline 67\% \\ \end{array} $	82% 57% 68% 70% 74% 64% 67%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 18\% \\ \hline 50\% \\ \hline 10\% \\ \hline 66\% \\ 97\% \\ \hline 52\% \\ \hline 71\% \\ 9\% \end{array}$	18% 71% 21% 68% 77% 67% 71%

Table C.37: Per level and query weighted recall when using BRF supervised approach/Google.

Table C.38: Per level and query weighted precision when using BRF supervised approach/Google.

	t	t	t	t	s	s	s	s
Dataset (Query)) sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	59%	80%	83%	59%	13%	40%	84%	84%
Arafat	85%	85%	85%	85%	89%	87%	93%	93%
Maliki	76%	51%	73%	73%	83%	75%	80%	80%
Sakhr	21%	59%	2%	58%	21%	74%	15%	15%
Jamaa Arabiya		77%	65%	65%	69%	88%	92%	91%
Thaheryah	75%	55%	75%	75%	67%	81%	85%	85%
Tarablus	60%	44%	44%	44%	42%	43%	43%	43%
Arabiyah	33%	33%	79%	33%	33%	77%	77%	77%
Asad	61%	1%	95%	95%	86%	83%	85%	84%
Athraa'	74%	74%	74%	77%	90%	76%	94%	94%
Qedra	11%	11%	81%	71%	62%	44%	62%	62%
	tw/s	tw/s	tw/s	tw/s	ip	ip	ip	ip
Dataset (Query)	sw	0						
		2-g	sw_2-§	$s = sw_2_3-s$				
Amman	87%	39%	59%	59%	g sw 13%	6 40%	50%	sw_2_3-g 43%
Amman Arafat	87% 100%	$\frac{39\%}{62\%}$	59% 95%	59% 95%	13% 85%	$\frac{40\%}{85\%}$	50% 4%	43%
Arafat Maliki	87% 100% 83%	39% 62% 87%	59% 95% 83%	59% 95% 83%	13% 85% 91%		50% 4% 91%	43% 4% 92%
Arafat Maliki Sakhr	87% 100% 83% 82%	39% 62% 87% 21%	59% 95% 83% 83%	59% 95% 83% 17%	13% 85% 91% 85%		50% 4% 91% 1%	$ \begin{array}{r} $
Arafat Maliki	87% 100% 83% 82% 67%	39% 62% 87% 21% 92%	59% 95% 83% 83% 65%		13% 85% 91% 85% 81%		50% 4% 91% 1% 80%	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Arafat Maliki Sakhr Jamaa Arabiya Thaheryah	87% 100% 83% 82% 67% 97%	39% 62% 87% 21% 92% 55%	59% 95% 83% 83% 65% 97%		13% 85% 91% 85% 81% 55%	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	50% 4% 91% 1% 80% 97%	$ \begin{array}{r}$
Arafat Maliki Sakhr Jamaa Arabiya	$\begin{array}{r} 87\% \\ 100\% \\ 83\% \\ 82\% \\ 67\% \\ 97\% \\ 52\% \end{array}$	39% 62% 87% 21% 92% 55% 43%	59% 95% 83% 83% 65% 97% 43%	59% 59% 95% 95% 17% 65% 97% 60%	13% 85% 91% 85% 81% 55% 59%	$\begin{array}{c ccccc} & 40\% \\ & 85\% \\ & 85\% \\ & 1\% \\ & 83\% \\ & 83\% \\ & 77\% \\ & 55\% \\ & 44\% \end{array}$	50% $4%$ $91%$ $1%$ $80%$ $97%$ $46%$	$ \begin{array}{r} \underline{43\%} \\ 43\% \\ 4\% \\ 92\% \\ 21\% \\ 80\% \\ 83\% \\ 44\% \\ \end{array} $
Arafat Maliki Sakhr Jamaa Arabiya Thaheryah	87% 100% 83% 82% 67% 97%	$ 39\overline{\%} \\ 62\% \\ 87\% \\ 21\% \\ 92\% \\ 55\% \\ 43\% \\ 63\% $	59% 95% 83% 83% 65% 97%		13% 85% 91% 85% 81% 55%	$\begin{array}{c ccccc} & 40\% \\ & 85\% \\ & 85\% \\ & 1\% \\ & 83\% \\ & 83\% \\ & 77\% \\ & 55\% \\ & 44\% \end{array}$	50% $4%$ $91%$ $1%$ $80%$ $97%$ $46%$	$ \begin{array}{r}$
Arafat Maliki Sakhr Jamaa Arabiya Thaheryah Tarablus Arabiyah Asad	$\begin{array}{r} 87\% \\ 100\% \\ 83\% \\ 82\% \\ 67\% \\ 97\% \\ 52\% \\ 55\% \\ 86\% \end{array}$	$\begin{array}{r} 39\% \\ 62\% \\ 87\% \\ 21\% \\ 92\% \\ 55\% \\ 43\% \\ 63\% \\ 86\% \end{array}$	59% 95% 83% 65% 97% 43% 79% 86%	$\begin{array}{c} & 59\% \\ & 95\% \\ & 95\% \\ & 83\% \\ & 17\% \\ & 65\% \\ & 97\% \\ & 60\% \\ & 79\% \\ & 99\% \end{array}$	$\begin{array}{c} 13\%\\ 85\%\\ 91\%\\ 85\%\\ 81\%\\ 55\%\\ 59\%\\ 79\%\\ 61\%\end{array}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 50\% \\ 4\% \\ 91\% \\ 1\% \\ 80\% \\ 97\% \\ 46\% \\ 81\% \\ 1\% \end{array}$	$\begin{array}{c}$
Arafat Maliki Sakhr Jamaa Arabiya Thaheryah Tarablus Arabiyah	$\begin{array}{r} 87\% \\ 100\% \\ 83\% \\ 82\% \\ 67\% \\ 97\% \\ 52\% \\ 55\% \end{array}$	$ 39\overline{\%} \\ 62\% \\ 87\% \\ 21\% \\ 92\% \\ 55\% \\ 43\% \\ 63\% $	59% 95% 83% 65% 97% 43% 79%	$\begin{array}{c} & 59\% \\ & 95\% \\ & 95\% \\ & 83\% \\ & 17\% \\ & 65\% \\ & 97\% \\ & 60\% \\ & 79\% \end{array}$	13% 85% 91% 85% 81% 55% 59% 79%	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 50\% \\ 4\% \\ 91\% \\ 1\% \\ 80\% \\ 97\% \\ 46\% \\ 81\% \\ 1\% \\ 76\% \end{array}$	$\begin{array}{c}$

C.3.12 Bing/Supervised Clustering/BRF

Table C.39: Per level and query macro F-measure when using BRF supervised approach/Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)			sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	81%	57%	85%	85%	31%	31%	30%	30%
Jarrar	29%	22%	29%	29%	38%	68%	30%	30%
Alishaa'	55%	27%	60%	60%	29%	27%	42%	66%
Arafat	50%	52%	52%	52%	62%	56%	56%	56%
Maliki	69%	22%	42%	55%	26%	41%	70%	70%
Sakhr	61%	32%	60%	60%	50%	27%	32%	34%
Malek Abdullah		31%	50%	47%	70%	65%	65%	66%
Jamaa Arabiya	36%	34%	53%	53%	95%	59%	68%	82%
Bursa	44%	31%	40%	38%	71%	36%	61%	61%
Thaheryah	68%	49%	61%	61%	71%	44%	65%	57%
Tarablus	51%	53%	22%	17%	79%	17%	81%	82%
Arabiyah	86%	8%	93%	93%	91%	25%	84%	84%
Asad	76%	29%	43%	31%	48%	46%	30%	78%
Athraa'	97%	35%	97%	97%	94%	33%	94%	94%
Qedra	91%	29%	89%	89%	78%	54%	72%	72%
	tw/s	tw/s	tw/s		ip	ip	ip	ip
Dataset (Query)	sw	2-g	sw 2-g	g sw_2_3-g	z sw	2-g	sw 2-g	sw 2 3-g
				,				
Amman	92%	57%	92%	92%	63%	6 36%	63%	62%
Jarrar	92% 35%	57% 32%	92% 33%	92% 33%	639 489	6 36% 69%	63% 45%	62% 45%
Jarrar Alishaa'	92% 35% 94%	57% 32% 32%	92% 33% 75%	92% 33% 75%	639 489 919		63% 45% 73%	62% 45% 71%
Jarrar Alishaa' Arafat	92% 35% 94% 63%	57% 32% 32% 52%	92% 33% 75% 63%	$ \begin{array}{c c} 92\% \\ 33\% \\ 75\% \\ 63\% \end{array} $	639 489 919 839		63% 45% 73% 84%	62% 45% 71% 84%
Jarrar Alishaa' Arafat Maliki	92% 35% 94% 63% 99%	57% 32% 32% 52% 53%	92% 33% 75% 63% 99%	$ \begin{array}{c c} 92\% \\ 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ \end{array} $	639 489 919 839 669		63% 45% 73% 84% 66%	62% 62% 45% 71% 84% 76%
Jarrar Alishaa' Arafat Maliki Sakhr	92% 35% 94% 63% 99% 63%	57% 32% 32% 52% 53% 28%	$ \begin{array}{r} 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ 31\% \end{array} $	$ \begin{array}{r} $	639 489 919 839 669 659		63% 45% 73% 84% 66% 65%	$ \begin{array}{r} \underline{62\%} \\ \underline{45\%} \\ \overline{71\%} \\ \underline{84\%} \\ \overline{76\%} \\ \underline{56\%} \\ \end{array} $
Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah	$\begin{array}{r} 92\% \\ 35\% \\ 94\% \\ 63\% \\ 99\% \\ 63\% \\ 88\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\$	$\begin{array}{c} & - & - & - \\ & 92\% \\ \hline & 33\% \\ & 75\% \\ \hline & 63\% \\ & 99\% \\ \hline & 31\% \\ \hline & 66\% \end{array}$	$\begin{array}{c}$	$ \begin{array}{r} 639 \\ 489 \\ 919 \\ 839 \\ 669 \\ 659 \\ 499 \\ \end{array} $		$\begin{array}{c c} & - & - & - & - \\ \hline & & - & - & - & - \\ \hline & & - & - & - & - \\ \hline & & - & - & - & - \\ \hline & & - & - & - & - & - \\ \hline & & - & - & - & - & - \\ \hline & & - & - & - & - & - \\ \hline & & - & - & - & - & - \\ \hline & & - & - & - & - \\ \hline & & - & - & - & - & - \\ \hline & & - &$	$\begin{array}{c c} & \underline{-62\%} \\ \hline 62\% \\ \hline 45\% \\ \hline 71\% \\ \hline 84\% \\ \hline 76\% \\ \hline 56\% \\ \hline 60\% \end{array}$
Jarrar Alishaa' Arafat Maliki Sakhr	$\begin{array}{r} 92\% \\ 35\% \\ 94\% \\ 63\% \\ 99\% \\ 63\% \\ 88\% \\ 79\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\ 72\% \\ $	$\begin{array}{c} 92\% \\ 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ 31\% \\ 66\% \\ 74\% \end{array}$	$\begin{array}{c} &$	$\begin{array}{c} 639\\ 489\\ 919\\ 839\\ 669\\ 659\\ 499\\ 809\end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} & - & - & - \\ & - & - & - & - \\ & - & -$	$\begin{array}{c c} & - & - & - & - & - & - \\ \hline & & 62\% & & \\ & 45\% & & \\ & 71\% & & \\ & 84\% & & \\ & 76\% & & \\ & 56\% & & \\ & 60\% & & \\ & 90\% & & \end{array}$
Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa	$\begin{array}{r} 92\% \\ 35\% \\ 94\% \\ 63\% \\ 99\% \\ 63\% \\ 88\% \\ \hline 79\% \\ \hline 71\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\ 72\% \\ 48\% $	$\begin{array}{c} 92\% \\ 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ 31\% \\ 66\% \\ 74\% \\ 61\% \end{array}$	$\begin{array}{c} &$	639 489 919 839 669 659 499 809 369	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} &$	$\begin{array}{c} & -62\% \\ \hline & 62\% \\ \hline & 45\% \\ \hline & 71\% \\ \hline & 84\% \\ \hline & 76\% \\ \hline & 56\% \\ \hline & 60\% \\ \hline & 90\% \\ \hline & 31\% \end{array}$
Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah	$\begin{array}{c} 92\% \\ 35\% \\ 94\% \\ 63\% \\ 99\% \\ 63\% \\ 88\% \\ 79\% \\ 71\% \\ 89\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\ 72\% \\ 48\% \\ 57\% \\$	$\begin{array}{c} 92\% \\ 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ 31\% \\ 66\% \\ 74\% \\ 61\% \\ 65\% \end{array}$	$\begin{array}{c}$	639 489 919 839 669 659 499 809 809 369 879	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} & - & - & - \\ & - & - & - & - \\ & - & -$	$\begin{array}{c} 62\% \\ \hline 62\% \\ \hline 45\% \\ \hline 71\% \\ \hline 84\% \\ \hline 76\% \\ \hline 56\% \\ \hline 60\% \\ \hline 90\% \\ \hline 31\% \\ \hline 79\% \end{array}$
Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus	$\begin{array}{c} 92\% \\ \hline 35\% \\ 94\% \\ \hline 63\% \\ 99\% \\ \hline 63\% \\ \hline 88\% \\ \hline 79\% \\ \hline 71\% \\ \hline 89\% \\ \hline 100\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\ 72\% \\ 48\% \\ 57\% \\ 22\% \\ $	$\begin{array}{c} 92\% \\ \hline 92\% \\ \hline 33\% \\ \hline 75\% \\ \hline 63\% \\ 99\% \\ \hline 31\% \\ \hline 66\% \\ \hline 74\% \\ \hline 61\% \\ \hline 65\% \\ \hline 99\% \\ \end{array}$	$\begin{array}{c}$	639 489 919 839 669 659 499 809 809 369 879 539	$egin{array}{c} 6 & 36\% \ 69\% \ 69\% \ 54\% \ 58\% \ 53\% \ 53\% \ 53\% \ 53\% \ 6 & 39\% \ 6 & 16\% \ 29\% \ 6 & 32\% \ 6 & 32\% \ 6 & 32\% \ 6 & 49\% \ 6 & 27\% \ 7 \ 7 \% \ 7 \ 7 \% \ 7 \ 7 \% \ 7 \ 7$	$\begin{array}{c} &$	$\begin{array}{c} 62\% \\ \hline 62\% \\ \hline 45\% \\ \hline 71\% \\ 84\% \\ \hline 76\% \\ \hline 56\% \\ \hline 60\% \\ 90\% \\ \hline 31\% \\ \hline 79\% \\ \hline 53\% \end{array}$
Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus Arabiyah	$\begin{array}{r} 92\% \\ 35\% \\ 94\% \\ 63\% \\ 99\% \\ 63\% \\ 88\% \\ 79\% \\ 71\% \\ 89\% \\ 100\% \\ 98\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\ 72\% \\ 48\% \\ 57\% \\ 22\% \\ 74\% \\ 8\% \\ 57\% \\ 22\% \\ 74\% \\ 8\% \\ 57\% \\ 5\% \\ 5\% \\ 5\% \\ 5\% \\ 5\% \\ 5\% \\ $	$\begin{array}{c} 92\% \\ 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ 31\% \\ 66\% \\ 74\% \\ 61\% \\ 65\% \\ 99\% \\ 84\% \end{array}$	$\begin{array}{c}$	$\begin{array}{c} 63\% \\ 63\% \\ 48\% \\ 91\% \\ 83\% \\ 66\% \\ 65\% \\ 49\% \\ 80\% \\ 36\% \\ 87\% \\ 53\% \\ 49\% \end{array}$	$egin{array}{c} & 36\% & 69\% & 69\% & 69\% & 69\% & 54\% & 58\% & 53\% & 53\% & 53\% & 53\% & 616\% & 29\% & 616\% & 29\% & 616\% & 29\% & 616$	$\begin{array}{c} 63\% \\ 63\% \\ 73\% \\ 84\% \\ 666\% \\ 665\% \\ 681\% \\ 75\% \\ 36\% \\ 36\% \\ 49\% \\ 553\% \\ 60\% \end{array}$	$\begin{array}{c} 62\% \\ \hline 62\% \\ \hline 45\% \\ 71\% \\ 84\% \\ \hline 76\% \\ \hline 56\% \\ \hline 60\% \\ 90\% \\ \hline 31\% \\ \hline 79\% \\ \hline 53\% \\ \hline 60\% \end{array}$
Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus Arabiyah Asad	$\begin{array}{c} 92\% \\ 35\% \\ 94\% \\ 63\% \\ 99\% \\ 63\% \\ 88\% \\ 79\% \\ 71\% \\ 89\% \\ 100\% \\ 98\% \\ 36\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\ 72\% \\ 48\% \\ 57\% \\ 22\% \\ 74\% \\ 44\%$	$\begin{array}{c} 92\% \\ 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ 31\% \\ 66\% \\ 74\% \\ 61\% \\ 65\% \\ 99\% \\ 84\% \\ 83\% \end{array}$	$\begin{array}{c}$	$\begin{array}{c} 63\% \\ 63\% \\ 48\% \\ 91\% \\ 83\% \\ 66\% \\ 65\% \\ 49\% \\ 80\% \\ 80\% \\ 80\% \\ 80\% \\ 80\% \\ 80\% \\ 80\% \\ 80\% \\ 49\% \\ 71\% \\ 71\% \end{array}$	$egin{array}{c} & 36\% & 69\% & 69\% & 69\% & 69\% & 54\% & 58\% & 53\% & 53\% & 53\% & 53\% & 616\% & 29\% & 616\% & 29\% & 649\% & 29\% & 649\% & 649\% & 649\% & 650\% & 8\% & 650\% & 29\% & 8\% & 650\% & 29\% & 650\% & 65$	$\begin{array}{c} 63\%\\ 63\%\\ 73\%\\ 73\%\\ 684\%\\ 666\%\\ 665\%\\ 81\%\\ 75\%\\ 36\%\\ 75\%\\ 536\%\\ 60\%\\ 60\%\\ 60\%\\ 90\%\\ \end{array}$	$\begin{array}{c} & - & - & - & - & - & - & - & - & - & $
Jarrar Alishaa' Arafat Maliki Sakhr Malek Abdullah Jamaa Arabiya Bursa Thaheryah Tarablus Arabiyah	$\begin{array}{r} 92\% \\ 35\% \\ 94\% \\ 63\% \\ 99\% \\ 63\% \\ 88\% \\ 79\% \\ 71\% \\ 89\% \\ 100\% \\ 98\% \end{array}$	$57\% \\ 32\% \\ 32\% \\ 52\% \\ 53\% \\ 28\% \\ 66\% \\ 72\% \\ 48\% \\ 57\% \\ 22\% \\ 74\% \\ 8\% \\ 57\% \\ 22\% \\ 74\% \\ 8\% \\ 57\% \\ 5\% \\ 5\% \\ 5\% \\ 5\% \\ 5\% \\ 5\% \\ $	$\begin{array}{c} 92\% \\ 92\% \\ 33\% \\ 75\% \\ 63\% \\ 99\% \\ 31\% \\ 66\% \\ 74\% \\ 61\% \\ 65\% \\ 99\% \\ 84\% \end{array}$	$\begin{array}{c}$	$\begin{array}{c} 63\% \\ 63\% \\ 48\% \\ 91\% \\ 83\% \\ 66\% \\ 65\% \\ 49\% \\ 80\% \\ 36\% \\ 87\% \\ 53\% \\ 49\% \end{array}$	$\begin{array}{c} 6 & 36\% \\ 6 & 69\% \\ 6 & 69\% \\ 6 & 54\% \\ 6 & 58\% \\ 6 & 53\% \\ 6 & 39\% \\ 6 & 16\% \\ 6 & 29\% \\ 6 & 49\% \\ 6 & 49\% \\ 6 & 49\% \\ 6 & 29\% \\ 6 & 8\% \\ 6 & 29\% \\ 6 & 38\% \end{array}$	$\begin{array}{c} 63\%\\ 6-3\%\\ 5-45\%\\ 5-73\%\\ 5-84\%\\ 5-84\%\\ 5-81\%\\ 5-81\%\\ 5-81\%\\ 5-75\%\\ 5-36\%\\ 5-36\%\\ 5-36\%\\ 5-36\%\\ 5-36\%\\ 6-90\%\\ 5-91\%$	$\begin{array}{c} 62\% \\ \hline 62\% \\ \hline 45\% \\ 71\% \\ 84\% \\ \hline 76\% \\ \hline 56\% \\ \hline 60\% \\ 90\% \\ \hline 31\% \\ \hline 79\% \\ \hline 53\% \\ \hline 60\% \end{array}$

Table C.40: Per level and query weighted recall when using BRF supervised approach/Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	83%	67%	86%	86%	41%	41%	39%	39%
Jarrar	33%	29%	33%	33%	40%	77%	34%	34%
Alishaa'	59%	42%	62%	62%	39%	42%	49%	67%
Arafat	63%	65%	65%	65%	70%	67%	67%	67%
Maliki	72%	36%	54%	63%	28%	55%	74%	74%
Sakhr	66%	43%	64%	64%	58%	43%	46%	47%
Malek Abdullah		36%	47%	45%	67%	63%	63%	64%
Jamaa Arabiya	50%	49%	59%	59%	95%	63%	70%	82%
Bursa	56%	47%	54%	53%	73%	53%	66%	66%
Thaheryah	72%	62%	68%	68%	74%	60%	70%	66%
Tarablus	51%	66%	36%	34%	81%	34%	81%	82%
Arabiyah	88%	21%	93%	93%	90%	31%	86%	86%
Asad	77%	44%	50%	45%	54%	53%	45%	80%
Athraa'	97%	52%	97%	97%	94%	49%	94%	94%
Qedra	91%	41%	89%	89%	80%	65%	76%	76%
	tw/s	tw/s	tw/s		ip		ip	ip
Dataset (Query)	sw	2-g	sw_2-g					
Amman	92%	69%	92%	92%	67%			66%
Jarrar	38%	35%	36%	36%	47%			45%
Alishaa'	93%	45%	75%	75%	91%			72%
Arafat	71%	65%	71%	71%	83%			84%
Maliki	99%	62%	99%	99%	72%			78%
Sakhr	70%	43%	45%	45%	66%			52%
Malek Abdullah	88%	64%	64%	64%	48%			57%
Jamaa Arabiya	79%	74%	75%	74%	819			90%
Bursa	73%	59%	66%	63%	53%			47%
Thaheryah	89%	66%	70%	70%	87%			81%
Tarablus	100%	36%	99%	99%	66%			66%
Arabiyah	98%	81%	86%	86%	48%			57%
Asad	47%	52%	84%	84%	719			61%
Athraa'	100%	55%	100%	100%	859	53%	91%	91%
Qedra	100%	63%	83%	89%	67%			63%

Table C.41: Per level and query weighted precision when using BRF supervised approach/Bing.

	t	t	t	t	s	s	s	s
Dataset (Query)	sw	2-g	sw_2-g	sw_2_3-g	sw	2-g	sw_2-g	sw_2_3-g
Amman	86%	62%	88%	88%	79%	79%	67%	67%
Jarrar	84%	83%	84%	84%	84%	61%	84%	84%
Alishaa'	80%	76%	80%	80%	41%	76%	63%	82%
Arafat	42%	43%	43%	43%	80%	78%	78%	78%
Maliki	74%	67%	67%	68%	37%	66%	74%	74%
Sakhr	67%	61%	64%	64%	55%	53%	52%	53%
Malek Abdullah		83%	69%	70%	86%	86%	86%	86%
Jamaa Arabiya	76%	76%	78%	78%	95%	79%	82%	85%
Bursa	76%	22%	76%	75%	82%	28%	79%	79%
Thaheryah	81%	77%	79%	79%	82%	35%	80%	78%
Tarablus	52%	44%	78%	11%	82%	11%	88%	88%
Arabiyah	90%	5%	93%	93%	93%	84%	85%	85%
Asad	84%	45%	60%	25%	76%	78%	29%	86%
Athraa'	97%	27%	97%	97%	95%	75%	95%	95%
Qedra	91%	77%	89%	89%	85%	78%	83%	83%
	tw/s	tw/s	tw/s	tw/s	ip		ip	ip
Dataset (Query)	\mathbf{sw}	2-g	sw_2-g			0		
Amman	94%	79%	94%	94%	64%			62%
Jarrar	84%	84%	84%	84%	85%			84%
Alishaa'	94%	77%	84%	84%	92%			82%
Arafat	80%	43%	80%	80%	88%			89%
Maliki	99%	67%	99%	99%	719	-		84%
Sakhr	60%	53%	52%	52%	73%			70%
Malek Abdullah	92%	86%	86%	86%	80%			80%
Jamaa Arabiya	86%	83%	84%	83%	86%			92%
Bursa	82%	77%	79%	78%	28%			22%
Thaheryah	92%	78%	80%	80%	89%			86%
Tarablus	100%	78%	99%	99%	44%			44%
Arabiyah	98%	85%	85%	85%	85%		86%	86%
Asad	38%	66%	84%	84%	78%			75%
Athraa'	100%	77%	100%	100%	889	6 75%	93%	93%
Athraa	100%	40%	86%	91%	66%	6 78%	66%	59%